(RESEARCH ARTICLE)

An investigation of teacher modeling's effect on pedagogical competence in public secondary school in Kenya

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Abstract

Teaching strategies of the 21st century worldwide are ever-changing and need constant upgrading through teacher mentorship practices (TMP) that enhance their pedagogical competence. The purpose of the study was to examine the effect of teacher modeling on pedagogical competence in public secondary schools in Kenya. The study adopted mixed methods research design, grounded in pragmatism research paradigm. The target population was 105,234 teachers including Principals from 8,933 public secondary schools in 47 counties in Kenya. Using the Krejcie and Morgan table (1970) a sample size of 384 was determined with a slight oversampling of 56 to 440 respondents. Teachers in national schools were preferred. Simple random sampling was used to get 36 counties from which 2 national schools were purposively sampled bringing the total number to 72 national schools. Principals from these schools were included in the study. Through purposive sampling 184 teacher mentors who were heads of departments were included in the study while 184 novice/teacher mentees were identified through simple random sampling. The data was collected using Focused Group discussion (FGD) and questionnaires. Qualitative data was analyzed using themes while quantitative data was analyzed using descriptive statistics namely frequencies, mean and standard deviations as well as inferential statistics namely Pearson correlation, ANOVA and simple linear regression analysis. The findings revealed that, teacher modeling has statistically significant effect on pedagogical competence in public secondary schools in Kenya (t= 9.328 (B=0.000) p<.0001). The study concludes that teacher modeling emerges as a multifaceted approach to professional development (PD), offering novice/mentee teachers a blueprint for pedagogical excellence across various dimensions. It recommends that for the purpose of teacher mentorship in public secondary, schools administrators should make teacher modeling a priority to foster their pedagogical competencies.

Keywords: Teacher Modeling; Pedagogical Competence; Secondary Schools; Kenya

1. Introduction

Teaching strategies of the 21 century worldwide are ever-changing and need constant upgrading to improve teacher pedagogical competence. Teacher pedagogical competence are explicit, demonstrable knowledge and skills necessary for performing the role of a teacher. Murkatik, et al., (2020) says pedagogical competence refers to how a teacher can teach a subject while adhering to idea like teaching from the known to the unknown, concrete to abstract, and simple to complex. Pedagogical competence therefore refers to the ability, skills or knowledge of a teacher to manage learning. Investing in teacher Professional development and support in enhancing their pedagogical skills is crucial for creating a dynamic and engaging learning environment that prepares learners for success in the 21st century.

According to World Economic Forum (WEF, 2022), 90% of the world work force will need to be reskilled by the year 2025; It further underline the preparation of learners for the fourth industrial revolution and leverage technology and

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pedagogical innovation to put learners at the center of learning, to this end teachers being part of the world work force, need to be prepared and allow for new skill and competencies in teaching and learning.

Reskilling teachers by 2025 is essential and educational institutions can help individual teachers to adapt to technological disruptions, navigate evolving job market demands and thrive in the future of work. Equally, teachers must be proficient in using digital tools, platforms and software to perform their teaching effectively. There is broad agreement that teachers play a key role in providing high-quality learning opportunities to students and fostering students' teaching (Schleicher, 2016) by leveraging their expertise, facilitating learning and serving as mentors and role models.

Teacher modeling being a key component of teacher mentorship practice, prepares teachers to face any challenge by equipping them with the necessary pedagogical competence they need to thrive in a rapidly changing teaching world. Teacher modeling involves experienced teacher/mentor demonstrating desired behavior, skills or strategies to a novice teacher/mentees and sharing of expertise. The teacher mentor and mentee collaborate in planning; co-teaching and delivering lessons together. This allows the teacher mentee to observe the teacher mentor in action, receive real-time feedback and gradually take on more responsibilities in the classroom leading to their PD. Bainton, et al., (2016) observes that Master Card Foundation (MCF) recognizes that teachers are central to an education system and that teacher quality is the single most important school-based variable affecting student performance, they further assert that strengthening school based support is essential for developing the professional capabilities of teachers including in-service training workshops, mentoring, and peer learning.

Okumu, et al., (2023) reaffirms that mentorship is an interactive process that helps individuals acquire teaching skills based on lesson design, methods of delivery, stimulating interests in the subject and motivating students to learn more effectively and efficiently thus improving teacher effectiveness mentoring is conceived to be a continuous process.

Teacher modeling helps teacher mentees acquire new teaching skills, strategies and techniques by observing a skilled teacher mentor in action. This can lead to improved job satisfaction and efficacy which in turn can influence their decision to stay in the profession and improve their classroom practices. It supports the teacher mentee's professional growth by providing them with opportunities to learn from experienced teacher mentors and reflect on their own classroom practices. Will (2017) reported that in the United States 86% of new teachers supported by a mentor teacher in the first years of their career remain in the classroom, while 71% of those without mentors leave the profession. This study underscored the importance of teacher mentorship programs for new teachers. Having a teacher mentor provides valuable support, guidance and PD opportunities that can help novice teacher navigate the challenges of their early career years.

In Africa, a study by Molla, et al., (2023) found out that faculty members' performance on 21 century teaching and learning competencies such as developing skills in critical thinking and problem solving, creativity and innovation, collaboration, communication, and information communication technology could not be considered satisfactory. The findings of the study suggested that urgent interventions are needed to develop university faculty members' 21st century pedagogical competence in the selected universities of Ethiopia. The 21st century classroom requires the 21st century teachers and students.

Studies conducted in Kenya have shown that quality education, meaningful teaching and positive learning outcomes results from teacher mentorship practices. Watene, et al., (2020) asserts that, when teachers achieve deeper knowledge of contents in various subjects, it improves their confidence in teaching and ensure students get quality knowledge that translate to improved performance in Kenya Certificate of Secondary Education (KCSE). However these studies covered a limited scope. This study attempts to fill the existing gap with focus on TMP and pedagogical competence in public secondary schools across Kenya.

1.1. Statement of the Problem

Globally successful education systems value teachers by training them to develop right skills and focus on building their capacity (UNESCO, 2021). The government of Kenya is committed to improve teaching standards and quality of education through its policy on Teacher Induction, Mentoring and Coaching, TIMEC (TSC, 2020). To complement the Commission's efforts, novice teachers are expected to go through teacher modeling programmes initiated by the principals and more experienced teachers in the relevant subjects in order to improve their pedagogical skills.

Teacher modeling equally, encourages novice teachers to reflect on their own teaching methods or practices by comparing and contrasting them with what they observe in experienced or teacher mentors. This promotes self-

awareness, critical thinking, identify strength plus areas of improvement and continuous improvement in pedagogical competence or approaches. However theoretical intentions of teacher modeling do not always translate in to practice or expected results in most schools. In a study by Neilsen and Neilsen (2021), the findings suggested that participating teachers' practices and rationales for integrating modeling into their teaching were characterized by a product oriented approach that was not well aligned with competence-oriented teaching. The current study was thus conducted to provide an understanding of the effect of teacher modeling on pedagogical competence in Kenya.

2. Literature Review

Teacher modeling is an instructional strategy in which an experienced teacher demonstrates a concept to novice teacher. It involves demonstrating effective teaching practices, instructional strategies and classroom management techniques to inspire and guide the teacher mentee in their professional growth.

Campbell, et al., (2015), examined modeling literature in top science education journals, to better understand the pedagogical functions of modeling instruction reported over the last decade and to understand the extent to which different modeling pedagogies were employed, The study found out that a conceptual understanding was the most common pedagogical function identified for modeling, while developing facility and understanding of science practices was identified least often, expressive modeling was the most frequently used and sequences which connected exploratory and experimental modeling were the most frequently observed combination of modeling pedagogies.

Krell and Krüger (2016), investigated 148 biology teachers' on understanding of models and modeling, their model-related teaching activities and relations between the two. The findings propose that models are primarily generated in biology lessons to show or to explain something but are rarely contrasted with other models, evaluated and modified. Significant correlations between teachers' understanding of the aspect testing models and their intensity of model-related teaching activities were found.

Anhalt, et al., (2018) looked at prospective teachers without prior mathematical modeling experience sheds light on how their newly developed conceptual understanding of modeling manifested itself in their work on the final task of a modeling module within a pedagogy course in secondary mathematics curriculum and assessment. The results suggest that infusing modules in existing courses can be an effective way to elevate prospective teachers from unfamiliarity with modeling to noticeable levels of proficiency in various modeling sub-competencies.

Stanmmen, et al., (2018), looked at the effects of modeling instruction PD on Biology teachers' scientific reasoning skills, sought to examine the effects of a modeling Instruction in a Biology workshop on teachers' scientific reasoning skills. The results suggested that the three week Modeling Instruction in the Biology workshop contributed to gains in in service teachers' scientific reasoning, and thus provides evidence that the teachers in this study are more prepared to help develop similar skills with their own students as they engage in the modeling instruction curriculum.

Mass and Engeln, (2018), assessed the impact of PD involving modeling on teacher and their teaching. It addresses the question of scaling-up PD. The results show that such a course can indeed lead to desired outcomes concerning the teachers and their teaching, and the research therefore adds to our understanding of scaling-up.

Miller, et al., (2018), investigated existing instructional strategies employed by teachers while teaching earth and space science with dynamic physical models. Classroom observation data revealed that from years 1 to 2, teachers shifted from a more didactic approach in which they used physical models primarily as tools for demonstration toward more student engagement with models as problem-solving tools. these findings present evidence that teachers can learn to guide their students toward using physical models in ways that approximate key aspects of how scientists use runnable models, as envisioned by the developing and using models practice of the Next Generation Science Standards.

Gray and Rogan-Klyve (2018), examined the classroom talk about models and modeling of two secondary science teachers implementing a model based inquiry instructional unit. The findings revealed the ways in which they used language to frame the modeling work of the classroom. Instances of modeling talk were identified in classroom videos, and coded using a framework for metamodeling knowledge. Findings revealed that, while instances of metamodeling talk were common, they were largely implicit.

The findings also revealed specific opportunities for explicit metamodeling talk by the teachers including during share out sessions and the negotiation of explanation criteria.

Jaggernauth (2021), explored the PD experiences of three secondary school Mathematics teachers who were enrolled in an in service TPD programme in Trinidad and Tobago from August 2013 to May 2014. This study directly addressed the paucity of teacher efficacy research in Trinidad and Tobago, and provides directions for future research about the sustainability of these beliefs beyond the period of PD.

Neilsen and Neilsen (2021), looked at new science curriculum, with a significant emphasis on modeling, recently adopted in Danish lower secondary education. The findings suggested that the participating teachers' practices and rationales for integrating models and modeling into their teaching were characterized by a product oriented approach that was not well aligned with competence-oriented teaching.

3. Methodology

3.1. Study Design

The study adopted mixed methods research design; the design combines elements of qualitative and quantitative research methods within a single study was used in order to allow for triangulation of data that the researcher got from FGD. The study was grounded in pragmatism research paradigm; qualitative data gave depth and context to quantitative data in this study, while quantitative data provided statistical support and generalization to qualitative findings of the study.

3.2. Target Population

The target population was 105,234 teachers from 8,933 public secondary schools in 47 counties in Kenya.

3.3. Sampling Techniques

Simple random sampling was used to select 36 counties from which 2 national schools (one boys school and one girls school) were selected purposively bringing the total to 72 national schools. The Principals in the selected schools took part in the study. Of these, however only 12 principals were randomly selected to participate in the FGD. From the sampled schools, purposive sampling was further employed to recruit 184 HOD's /teacher mentors while simple random sampling was used to recruit 184 novice/teacher mentees to take part in the study. Reliability was ensured by conducting a pilot study, Cronbach's alpha coefficient was used to measure reliability of the research instruments and factor analysis was conducted to test validity. The data was collected using FGD and online questionnaires. Qualitative data was analyzed using themes and descriptive statistics through'; frequencies, mean and standard deviations, while quantitative data using Pearson correlation, ANOVA and simple linear regression analysis. Mixed methods research was used in order to allow for triangulation of data from FGD; the results from quantitative data were validated and complemented from qualitative method thus enhancing the credibility and reliability of the study. The methods enabled the researcher to enhance the validity of the study findings by addressing any potential biases and limitations of one method. The method provided flexibility in collecting and analyzing data for this study.

3.4. Sample Size

To get the sample size, the study used Krejcie and Morgan table (1970) to determine a sample of 384 with an oversampling of 56 to improve the statistical power. The study sample size therefore was 440 respondents that comprised 72 principals, 184 teacher mentors; HODs or heads of subjects with five or more years of teaching experience and 184 teacher mentees who were novice teachers with less than five years in teaching in five academic departments in sampled schools. The study was carried out in public national schools as they are known for their rigorous academic programs, well equipped and high educational standards. These schools also receive new teachers yearly and have a tradition of mentoring novice teachers.

Principals were purposively sampled, to represent their institutions in the study. Purposive sampling was used to recruit HODs as teacher mentors from specific departments in the schools that participated in the study while simple random sampling was used to recruit teacher mentees who were paired up with HODs in their respective departments and subject areas. Maintaining an equal number of teacher mentors and teacher mentees in the study, helped optimize the effectiveness of mentoring programs, promote fairness and equity, and enhanced the quality of mentorship relationships that allowed for deeper and more meaningful connections, collaboration between the HODs, novice teachers and principal was key to this study. A Sample Frame of the individuals that participated in the study are shown in Table 1.

Table 1 Summary of Sample Frame

Category	Target Population (N)	Sample Size (n) ± 5
Principals	8,933	72
Teacher Mentors	48,145	184
Teacher Mentees	48,145	184
Total	105,234	440

Source: Researcher, 2024.

3.5. Data Collection, Analysis and Presentation

The study made use of Focused Group Discussion (FGD) and online questionnaires to collect data. Nyumba, et al., (2018) asserts that FGD is frequently used as a qualitative approach to gain an in-depth understanding of social issues. Information gathered from the focus group, was used to understand the group's perspective on teacher modeling practices and pedagogical competencies in public secondary schools in Kenya. Thematic analysis was used to analyze qualitative data. According to Caulfield, (2023), a thematic analysis is a method of analyzing qualitative data. The responses from FGD were coded to generate themes, reviewing themes, defining and naming of themes and lastly writing up.

Online Survey Questionnaires targeted, principals, teacher mentors, and teacher mentee. The questionnaire for teacher mentors had 30 items for mentors and 30 for lesson observation related to teacher mentorship practices and their pedagogical competencies. The questionnaire were presented in Google form and where distributed to participants after obtaining their consent through email and WhatsApp. The collected data from online responses where converted into excel and analyzed using both descriptive and inferential statistics. Data from online questionnaires was screened and cleaned to remove outliers and any biases then classified and tabulated for data analysis. Statistical Package for Social Sciences (SPSS) was used to analyze data. The study was based on scale of 5-point Likert used by the respondents in data collection using the online questionnaire. The scale was interpreted using the ranges of 1 – 5, where 1 = Not at all, 2 = Slightly, 3 = Moderately, 4 = Very, and 5 = Fully agree. In addition to the use of percentages and the mean values, the corresponding standard deviation of each item was reported to evaluate the level of variance.

The inferential statistics; linear regression analysis and ANOVA were used to test the hypothesis at 0.05 level of significance. The study sought to determine the effect of teacher modeling on pedagogical competence in public secondary schools in Kenya. In order to determine the effect, a multi regression analysis was done to make prediction. The model was of the form; $Y_i = b_o + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + \varepsilon$

Where $X_{1\ldots} X_n$ are the independent variables.

Y = Pedagogical Competence
b_o - Constant
$b_1 - b_5$ - Regression coefficient is the net change in Y for each unit change in X_1 holding X_1 - Teacher Modeling
X_2 - Teacher Coaching
X_3 - Teacher Role-Playing
X_4 - Collaborative Teaching
X_5 - Consultative Teaching
X_n Qualitative data was transcribed and reported thematically in line with the objectives.

4. Results and Discussions

Data from Table 2 shows that almost three quarters (72.5%) of the teacher mentee agreed or fully agreed that they have good understanding of teacher modeling. The findings suggest that the majority of teacher mentees in public secondary schools in Kenya feel confident in their understanding of teacher modeling. This could indicate that the mentorship or training they received on this topic was effective. Similarly, Stanmman et al., (2018) observes that three week modeling instruction in the Biology workshop contributed to gains in in-service teachers' scientific reasoning, and thus provides evidence that the teachers in this study were more prepared to help develop similar skills with their own students as they engage in the modeling instruction.

Table 2 Teacher Mentee Response on the Effect of teacher modeling on Pedagogical Competence

Statement on Teacher Modelling	1	2	3	4	5	Mean	SD
I have good understanding of teacher modeling	4	9	28	59	49	3.940	1.253
	2.7%	6.0%	18.8%	39.6%	32.9%		
This school has adequate teacher modeling programmes in place	34	42	31	19	23	2.698	1.354
	22.8%	28.2%	20.8%	12.8%	15.4%		
Teacher modeling practices has enhanced the way I introduce and organize my lessons	12	18	39	37	43	3.544	0.868
	8.1%	12.1%	26.2%	24.8%	28.9%		
I have participated in teacher modeling practices to enhance my subject content delivery	7	8	37	52	45	3.805	0.686
	4.7%	5.4%	24.8%	34.9%	30.2%		
I have participated in teacher modeling practices to enhance my classroom management skills	9	11	33	49	47	3.765	1.022
	6.0%	7.4%	22.1%	32.9%	31.5%		
I have participated in teacher modeling practices to enhance my communication skills	8	18	28	38	57	3.792	1.653
	5.4%	12.1%	18.8%	25.5%	38.3%		
I have participated in teacher modeling practices to enhance use my of Information Communication Technology and digital skills	35	34	38	23	19	2.711	1.452
	23.5%	22.8%	25.5%	15.4%	12.8%	3.465	1.184
Total							

Confidence in their understanding of teacher modeling can boost teacher mentees confidence in their teaching abilities. This agrees with discussant 5 who remarked that;

….*Mentee teachers have been modeled on how to involve learning and how to do it effectively.*

This may lead to more effective teaching or classroom practices and better engagement. It is therefore worth noting that, teacher modeling is an important aspect of effective teaching or classroom practices. Now that a large percentage of teacher mentees believe they have a good understanding of it, it may imply that they are more likely to incorporate this method into their own teaching practices which can benefit learners learning outcomes.

The positive aspect of agreement indicate that, training programme or teacher mentorship practices in public secondary schools in Kenya focusing on teacher modeling is likely effect in conveying the necessary pedagogical competence to the teacher mentees. This understanding can translate into improved teaching or classroom practices and potentially better outcomes for learners. It would be vital for educators and schools to continue supporting and reinforcing this understanding through ongoing PD and teacher mentorship programmes.

More than half of the teacher mentees (51.0 %) did not agree at all that their school has adequate teacher modeling programmes in place. This implied that most school did not have adequate teacher modeling programmes in place. The findings suggest that, there may be room for improvement in the existing teacher modeling programmes in public secondary schools in Kenya. This could indicate that some teacher mentees feel that the programmes are lacking in certain areas or are not as comprehensive as they should be. This view was supported by participant 2, who felt;

…..*However, teachers don't find it interesting but it has enhanced teacher preparation of lessons*.

There might be a need for more robust and comprehensive training programmes on teacher modeling within schools. If a significant portion of teacher mentees feel that the current programmes are not adequate, it could also mean that there are possible gaps in training and support provided to teachers in this area. Lack of interest was cited as one of the factors. Therefore teacher mentors should make modeling programmes more interesting and lively by motivating teacher mentees. Inadequate teacher modeling programmes may potentially impact the quality of teaching and learning

in schools. If teachers do not have access to effective modeling practices, they may struggle to implement best teaching practices in classrooms which could affect learners' outcome. Mass and Engeln, (2018), concur with the above argument that such a course; modeling can indeed lead to desired outcomes concerning the teachers and their teaching. It highlights an opportunity for schools in Kenya and educational institutions to review and strengthen their teacher modeling programmes. It important that schools to provide comprehensive and effective training programmes to support teachers in their PD. If inadequacies are addressed in teacher modeling programmes can help improve teaching practices, enhance student learning experiences and ultimately contribute to better educational outcomes.

A majority of the teachers (53.7 %) of the teacher mentee agreed or fully agreed that that the teacher modeling practices has enhanced the way they introduced and organized their lessons. 43 (28.9%) teacher mentees fully agreed and 37 (24.8 %) teacher mentees agreed, 39 (26.2%) teacher mentees moderately agreed this implied that most teacher modeling practices had enhanced the way they introduced and organized their lessons. The findings indicate that the majority of teacher mentees recognize the positive impact teacher modeling on their teaching or classroom practices. This suggest that teacher modeling has been effective in helping them improve how they introduce and organize their lessons. This is in agreement with remarks from Respondent 2.

"Teacher mentorship practices have a positive effect on how teachers introduce and organize their lessons in classroom; teacher modeling for example, it has led to better organization of the lesson and stimulating introduction,"

The agreement indicates that teacher mentees have benefited from observing and learning from effective teacher modeling practices in public secondary schools in Kenya.

This experience is likely to contribute to their professional growth and development as educators. Moreover, the fact that over half of the teacher mentees believe that teacher modeling has enhanced their lesson introduction and organization, it signify that they are actively applying what they have learned from these models in their own teaching contexts, the findings therefore underscores the importance of providing opportunities for teachers to observe and learn from experienced teacher mentors as a means of PD. It's imperative that schools and other educational institutions should continue to promote and support teacher modeling programs to help teachers refine their classroom or instructional practices and eventually benefit students learning outcome. Participant 5. Remarked that;

"The mentors have helped the novice teachers do good introduction and organization of lessons, especially on what should be done within the first minutes and before the lesson begins. The mentor demonstrates in a teaching and learning situation then the novice teachers will perform the skill under supervision."

The teacher mentees also agreed that they participated in teacher modeling practices to enhance their subject content delivery (65.1%). 45 (30.2 %) mentees fully agreed and 52 (34.9 %) mentees agreed, this implied that most teacher participated modeling practices to enhance their subject content delivery. 37 (24.8 %) mentees moderately agreed while 15 (10.1 %) mentees slightly agreed or did not agree at all. The findings suggests a positive relationship between teacher mentorship and the development of pedagogical competence among novice or teachers mentees, the high percentage of teacher mentees engaging in teacher modeling practices indicate that mentorship programs in public secondary schools in Kenya are effective in transforming knowledge and skills from experienced teachers to novice teachers or new educators.

This can lead to improved classroom practices; improved teaching techniques, classroom management strategies and subject matter expertise among teacher mentees. Engaging in teacher modeling implies that teacher mentees are actively involved in observing, demonstrating, Feedback and Reflection, Collaborative Planning, Co-teaching, Observation and Feedback, Professional Development, Modeling Effective Communication and Building Relationships, imitating and practicing the teaching strategies demonstrated by teacher mentors. This hands on learning approaches can be highly effective in enhancing pedagogical competence as it allows teacher mentees to directly apply new techniques in their own teaching practices. More so the willingness of teacher mentees to participate in teacher modeling also suggests a strong commitment to professional growth and continuous improvement. Respondent 5. Remarked that;

"*The mentor has been interacting with subject content and is able to guide the teacher mentee on how to deliver using teaching aids and best teaching methods." Mentee teachers have been modeled on how to involve learning and how to do it effectively. The mentor normally demonstrates in a classroom learning situation then the mentor practices. "Through teacher modeling mentors have been able to help mentees on how to choose the best teaching methods according to the type of content, equally mentors are aware that learning involves participation hence the mentee is modeled on how to involve learners in learning. The mentor demonstrates in a learning situation then the mentee practices."*

Thus by actively seeking out opportunities to learn from experienced teacher mentors, mentees demonstrate a growth mindset and a desire to enhance their classroom practices or teaching skills for the benefit of their learners. It is worth noting that teacher modeling not only benefits individual mentees but also foster a culture of peer learning and collaboration within the teaching community. Teacher mentees who engage in modeling practices may also become teacher mentors themselves in the future, thus perpetuating a cycle of knowledge sharing and skills development. The sustainability of teacher mentorship can foster positive learners' outcome and ultimately quality education. To sum it up, the high agreement among teacher mentees regarding participating in teacher modeling practices reflects the positive impact mentorship on pedagogical competence and PD of novice teachers. By actively engaging in learning from experienced teacher mentors, mentees can acquire new skills refine their instructional or teaching practices and eventually improve learner outcome.

At the same time more than half (64.4 %) of the teacher mentees agreed that they participated in teacher modeling practices to enhance their classroom management skills. 47 (31.5 %) mentees fully agreed and 49 (32.9 %) mentees agreed, this implied that most that the teachers participated in teacher modeling practices to enhance their classroom management skills. 33 (22.1 %) mentees moderately agreed and 20 (13.4 %) mentees slightly agreed or did not agree at all. The study findings suggest that, mentorship practices in public secondary schools in Kenya play a crucial role in developing not only pedagogical competence but also effective classroom management techniques among novice teachers. Respondent 4. Observed that**;**

"*Teacher modeling provides valuable insights into classroom management strategies. Novice teachers can observe how experienced educators establish and maintain a positive learning environment, manage student behavior effectively, and address challenges that may arise during instruction.*"

Effective classroom management is essential for creating a conducive learning environment where learners can thrive academically and behaviorally, by actively engaging in teacher modeling practices, focused on classroom management, teacher mentees demonstrate a recognition of the significance of this aspect of teacher mentorship. Similar to enhancing subject content delivery, participating in teacher modeling practices for classroom management allows teacher mentees to observe, learn and practice strategies that promote positive behavior, engagement and discipline in the classroom. This hands on learning [earning approach can be instrumental in horning their skills in managing diverse learners behaviors and maintaining a productive learning atmosphere. Engaging in teacher modeling practices for classroom management helps teacher mentees learn practical strategies and techniques for addressing common classroom challenges; such as learner disruption, time management and fostering a positive classroom climate. When teacher mentees implemented these strategies in their own classroom or teaching practices they can develop skills and confidence in managing their classrooms effectively.

The zeal and willingness of teacher mentees to participate in teacher modeling practices for classroom management indicates a collaborative approach to PD. If novice teachers can learn from experienced or teacher mentors and share best classroom management practices with colleagues, teachers collectively will improve their classroom practices and create a supportive network for continued learning and growth. In summary, the strong agreement among teacher mentees regarding their participation in teacher modeling practices for enhancing classroom management skills underscores the importance of mentorship in developing well round teachers. By focusing on both pedagogical competence and classroom management, mentorship programs can equip teachers with the skills and strategies needed to create engaging, orderly and effective learning environment for the learners.

The study further noted that 63.8 % of the teacher mentees agreed that they participated in teacher modeling practices to enhance their communication skills. 57 (38.3 %) mentees fully agreed and 38 (25.5 %) mentees agreed, this implied that most teacher participated in teacher modeling practices to enhance their communication skills. 28 (18.8 %) mentees moderately agreed and 26 (17.6 %) mentees slightly agreed. The findings show a high agreement among teacher mentees regarding their participation in teacher modeling practices for enhancing communication skills in public secondary schools in Kenya. This highlights the importance of effective communication in teaching and the value of mentorship in supporting teachers PD. Effective communication is a fundamental skill for teachers as it impacts their ability to convey information clearly, engage learner, built relationships and manage classroom dynamics. More so by modeling these behaviors and techniques, teacher mentees can practice and refine their own communication skills such as active listening, clarity of expression and empathy. When teacher mentees are actively engaged in teacher modeling practices that focuses on communication they demonstrate a recognition of the importance of the skill in their teaching. Practice. By focusing on improving communication abilities in teaching and through observation, practice and feedback, teacher mentees can become more skilled communicators who can connect with their students, colleagues, and communities in a more meaningful and impactful way. Respondent 4. Noted that;

"*Effective teacher modeling demonstrates how to actively engage students in the learning process and foster meaningful communication within the classroom. Novice teachers can observe communication techniques for eliciting student participation, facilitating discussions, and promoting a collaborative learning environment.*"

On the other hand a majority of the teacher mentees (46.3 %) slightly agreed or did not agree that they participated in teacher modeling practices to enhance use ICT and digital skills. 35 (23.5%) mentees did not agree at all and 34 (22.8 %) mentees slightly agreed, this indicated that most teachers participated in teacher modeling practices to enhance use Information Communication Technology and digital skills. The findings suggests a more mixed or neutral response compared to the findings related to subject matter, content delivery classroom management and communication skills. This implies that some teacher mentees feel confident and proficient after they participated in modeling practices to enhance the use of ICT and digital content in their classroom or teaching practices. This may be due to prior knowledge: experience or expertise on use of technology tools; computers, laptops, projectors and internet. While others might feel less comfortable or inexperienced in this area and shy off from engaging in modeling practices to improve teacher use if ICT and digital skills in teaching. This diversity in responses therefore could reflect varying levels of familiarity and exposure to digital tools and resources among teachers in public secondary schools in Kenya. There is need for targeted support and training in the areas of ICT and digital skills within mentorships programmes. Teacher mentees who are less familiar with technology may benefit from additional guidance, resources and opportunities to enhance their use of ICT and digital literacy. Techer modeling practices can play an important role in supporting teachers in adopting and leveraging technology to enhance learner engagement, collaboration, learning outcomes and classroom practice to meet the evolving needs of 21st century teachers and learners. Teacher modeling can aid novice teachers in becoming technologically compliant and integrating ICT and digital literacy skills into their teaching or classroom practices

4.1. Mentors response on the effect of teacher modeling on pedagogical competence

Table 3 Mentor response on Teacher Modeling

Statement	1	2	3	4	5	Mean	SD
Teacher modeling has enhanced my skills of lesson introduction and organization of novice/less experienced teachers.	7	34	24	41	43	3.530	1.325
	4.7%	22.8%	16.1%	27.5%	28.9%		
Teacher modeling has enhanced my subject content delivery of novice/less experienced teachers in my department.	5	27	29	39	49	3.671	0.985
	3.4%	18.1%	19.5%	26.2%	32.9%		
Teacher modeling has enhanced my teaching strategies of novice/less experienced teachers in my department.	12	24	24	41	48	3.597	1.345
	8.1%	16.1%	16.1%	27.5%	32.2%		
Teacher modeling has enhanced my classroom management skills of novice/less experienced teachers in my department.	7	12	37	52	41	3.725	1.002
	4.7%	8.1%	24.8%	34.9%	27.5%		
Teacher modeling has enhanced my communication skills of novice/less experienced teachers in my department.	7	9	28	47	58	3.940	1.652
	4.7%	6.0%	18.8%	31.5%	38.9%		
Teacher modeling has enhanced use ICT and digital literacy skills of novice/less experienced teachers in my department. Total	32	41	29	24	23	2.765	0.785
	21.5%	27.5%	19.5%	16.1%	15.4%	3.538	1.82

Data from Table 3 shows that more than half (56.4%) of the teacher mentors agreed or fully agreed that teacher modeling has enhanced the skills of lesson introduction and organization of novice/less experienced teachers in their department 43 (28.9 %) mentor fully agreed and 41 (27.5 %) mentors agreed, 24 (16.1%) mentors moderately agreed this is a strong indication that teacher modeling has enhanced the skills of lesson introduction and organization of novice/less experienced teachers in their department. 41 (27.5 %) mentors slightly agreed or did not agree at all. The findings indicate that novice teachers in public secondary schools in Kenya through teacher modeling observed learning and practice, guidance and supportive environment by teacher mentors within their departments helped them to develop the skill of lesson introduction and organization through observation and practice. This underscores the significance of experienced teacher mentors sharing their expertise and knowledge with novice teachers to enhance their pedagogical kills and overall effectiveness. Respondent 2 posits that

…Teacher modeling for example has led to better organization of the lesson and simulating introduction,

More than half of the teachers mentors (59.1 %) slightly agreed or did not agree at all that teacher modeling has enhanced subject content delivery of novice teachers in my department. 49 (32.9%) mentors did not agree at all and 39 (26.2 %) mentors slightly agreed, this indicated that teacher modeling has enhanced subject content delivery of novice/less experienced teachers in the department. The findings indicate that teacher modeling may not be very impactful in improving subject content delivery of novice teachers in public secondary schools in Kenya. This implies that there is lack of effectiveness due to factors like; time constraints, heavy workload for both teacher mentor and mentee and syllabus coverage can affect implementation of modeling programmes in these schools. Teacher mentors should therefore reassess how they model subject content for novice teachers in order to enhance their pedagogical competence. Potential areas of improvement such as, enhanced demonstration by teacher mentors, and collaboration to support novice teachers' classroom practices,

A majority of the teachers (57.7 %) of the teacher mentors agreed or fully agreed that that the teacher modeling has enhanced teaching strategies of novice/less experienced teachers in my department. 48 (32.2%) mentors fully agreed and 41 (27.5 %) mentors agreed, 24 (16.1%) mentors moderately agreed this indicated that teacher modeling has enhanced teaching strategies of novice/less experienced teachers. The study findings reinforces the positive impact of teacher modeling on enhancing teaching strategies as a pedagogical competence in public secondary schools in Kenya.

This suggest that teacher modeling is perceived as an effective method for improving teaching strategies among novice teachers within specific department. When experienced teachers model effective teaching strategies, novice teachers have the opportunity to observe, learn and emulate these strategies in their own classroom practices. These can lead to acquisition of best teaching practices and refinement of teaching skills among novice teachers this collectively elevate the quality of teaching within the department that can lead to positive leaners outcome eventually quality education.

The teacher mentors also fully agreed or fully agreed that teacher modeling has enhanced classroom management skills of novice/less experienced teachers in my department (65.1%). 41 (27.5 %) mentors fully agreed and 52 (34.9 %) mentors agreed, this indicated that teacher modeling has enhanced classroom management skills of novice/less experienced teachers. 37 (24.8 %) mentors moderately agreed while 15 (10.1 %) mentors slightly agreed or did not agree at all. The findings indicate that teacher modeling has a positive impact on classroom management within the departments in public secondary schools in Kenya. Classroom management is a critical component in teaching that encompasses creating a positive and organized learning environment, establishing routines, managing learners' behavior and promoting student engagement. When novice teachers observe experienced teachers model effective classroom management strategies with tangible examples, and practical guidance, novice teachers can learn practical techniques for maintaining discipline, fostering a positive classroom climate and maximize student learning.

On the other hand a majority of the teacher mentors (49.0 %) slightly agreed or did not agree that they teacher modeling has enhanced use ICT and digital literacy skills of novice/less experienced teachers in my department. 32 (21.5%) mentees did not agree at all and 41 (27.5 %) mentees slightly agreed, this indicated that teacher modeling did not enhanced use ICT and digital literacy skills of novice/less experienced teachers in my department. The findings indicate a more divided perspective on effectiveness of teacher modeling on novice teachers ICT and digital literacy in public secondary schools in Kenya. This may suggest that while some teacher mentors may perceive teacher modeling as beneficial for enhancing ICT and digital literacy, others may not see the same level of effectiveness or impact. Novice teachers may require more structured training or PD opportunities focused on ICT integration to build their proficiency in their classroom practices. This may depend on the availability of electricity, resources, support systems and I access to technology within the departments in public secondary schools.

In order to establish the relationship between; Correlation between Teacher modeling and pedagogical competence, *Pearson* correlation analysis was used to find out if there existed a relationship. A correlation is a number between -1 and +1 that measures the degree of relationship between two variables. The correlation coefficient value (r) that ranges from 0.10 to 0.29 would be considered weak, from 0.30 to 0.49 would be considered medium and from 0.50 to 1.0 would be considered strong. Therefore a positive value for the correlation would imply a positive relationship and a negative value for the correlation would imply an inverse or negative association. The study findings are shown on Table 4.

Table 4 Pearson Correlation of Teacher Modeling and Pedagogical Competence

		Pearson's Correlation	1	2	3	4	5	6	7	8
1	Pedagogical competence	Correlation	1							
		Sig.								
2	I have good understanding of teacher modeling	Correlation	0.635**	1						
		Sig.	0.000							
3	This school has adequate teacher modeling programmes in place	Correlation	0.524**	0.621**	1					
		Sig.	0.029	0.000						
4	Teacher modeling practices has enhanced the way I introduce and organize my lessons	Correlation	0.325	0.110	0.124	1				
		Sig.	0.865	0.536	0.235					
5	I have participated in teacher modeling practices to enhance my subject content delivery	Correlation	0.534**	0.398**	0.664**	0.458**	1			
		Sig.	0.003	0.038	0.000	0.038				
6	I have participated in teacher modeling practices to enhance my classroom management skills	Correlation	0.634**	0.114	0.752**	0.270	0.312	1		
		Sig.	0.007	0.664	0.978	0.652	0.523			
7	I have participated in teacher modeling practices to enhance my communication skills	Correlation	0.458**	0.485**	-0.107	0.012	0.214	0.012	1	
		Sig.	0.023	0.033	0.385	0.965	0.756	0.865		
8	I have participated in teacher modeling practices to enhance use of Information Communication Technology and digital skills	Correlation	0.102	359**	0.210	0.023	0.221	0.451**	0.110	1
		Sig.	0.562	0.965	0.287	0.475	0.854	0.042	0.352	

**. Correlation is significant at the 0.05 level (2-tailed) Source: Author 2024

Based on this correlation matrix in Table 4 there exists a correlation between teacher modeling and pedagogical competence in public secondary schools in Kenya. Indeed teacher modeling correlated with pedagogical competence in public secondary schools. The correlations were between 0.102 and 0.635. Six out of the eight factors of teacher modeling correlated with pedagogical competence. Therefore, pedagogical competence in public secondary schools in Kenya was likely affected by teacher modeling practices.

The Pearson correlation index obtained on the first variable ".I have good understanding of teacher modeling "was r= 0.635, it is strong positive correlation with ρ<0.0001 which is less than alpha = 0.05 which means that understanding of teacher modeling would likely affect pedagogical competence. The second variable "This school has adequate teacher modeling programmes in place" moderately correlate with pedagogical competence. ((r =0.524, ρ=.29) at α= 0.05)). The fourth variable "I have participated in teacher modeling practices to enhance my subject content delivery." moderately correlated with pedagogical competence. ((r = 0.534, ρ<0.0001) at α= 0.05)). The fifth variable "I have participated in teacher modeling practices to enhance my classroom management skills" strongly correlated with pedagogical competence. ((r =0.634, ρ=007) at α= 0.05)).The sixth variable "I have participated in teacher modeling practices to enhance my communication skills" Moderately correlated with job satisfaction. ((r =0.458, ρ=0.023) at α= 0.05)). The correlation between the third and seventh variable and pedagogical competence was not statistically significant ((r =-0.325, ρ=0.865) at α= 0.05)) and ((r =-0.102, ρ=0.562) respectively at α= 0.05)).

4.2. Regression Analysis and Hypothesis Testing

This study carried out the diagnostic tests to ensure that the assumptions of regression model are met and proceeded to test the formulated null hypothesis which stated that; *Teacher modeling has no statistically significant effect on pedagogical competence in public secondary schools in Kenya.* Simple linear regression analysis was used to test the hypothesis at 0.05 alpha levels. Tables 5, 6, and 7 showed the information from the analysis.

Table 5 The Regression Model Summary for Effect of Teacher Modeling on Pedagogical Competence

Model Summary					
Model	R	R- Square	Adjusted R- Square	Std. Error of the Estimate	p-value
1	0.583[a]	0.512	0.465	0.85246	0.000

a. Predictors: (Constant), Teacher modeling b. Dependent Variable: pedagogical competence

Table 4.9 shows the value in R, (r = .512), indicating there was a medium positive relationship between the two variables- teacher modeling on pedagogical competence. The coefficient of determination indicated R-Square, (R^2 = .464), reveals the amount of variability in pedagogical competence that can be explained by the variable teacher modeling practices. In this case, the value of adjusted R square reveals that 46.4 % variability in pedagogical competence can be explained by teacher modeling practices. The analysis indicates that 53.6 % unexplained variation can be attributed to other factors not included in this model. Further Table 6 presents the ANOVA results.

Table 6 ANOVA Test for the effects of Teacher Modeling on Pedagogical Competence

	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	62.352	1	36.651	63.521	0.000[a]
	Residual	112.356	147	2.362		
	Total	174.708	148			

a. Predictors: (Constant), Teacher modeling b. Dependent Variable: pedagogical competence

Table 6 discloses whether or not the model is a significant predictor of pedagogical competence. The analysis in Table 6 shows ANOVA results of F=63.521 with 1 and 147 degrees of freedom and F being significant at p<.05. Given this result, it can be presumed that the regression model significantly predicts the extent to which Teacher modeling practices affect pedagogical competence. The regression equation establish from this output may be stated as F (1,147) =63.521 p<.0001). Furthermore, Regression Coefficient (Table 7) reveals how (Teacher modeling practices) the predictor variable contribute to the model.

Table 7 shows the results of the regression coefficient analysis. It is the equation that provides

Table 7 Regression Coefficient for the effects of Teacher Modeling on Pedagogical Competence

Coefficients						
	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Constant	1.362	0.856		18.235	.000
	Teacher Modeling	.142	0.023	0.085	9.328	.000

a. Predictors: (Constant), Teacher modeling b. Dependent Variable: pedagogical competence

Information about the change in the value of the dependent variable (*pedagogical competence*) corresponding to one unit change in the independent variable (Teacher modeling practices. The data in Table 7 indicates the model;

Y (pedagogical competence) = 1.362 + 0.142 X_1 + ε (X_1= Teacher modeling practices), where Y is the estimated value of the dependent variable, and X is the value of the independent variable. Based on the results, the regression coefficient reveals that an increase of 1 unit in the effects of Teacher modeling practices leads to an increase pedagogical competence by 0.142 units.

The findings in Table 7 of the regression indicates effects teacher modeling practices explained significant proportion of variation in pedagogical competence, (t= 9.328 (B=0.000) p<.0001). Based on this evidence in Table 7, the study rejected the null hypothesis, that; "*Teacher modeling has no statistically significant effect on pedagogical competence in public secondary schools in Kenya...*" This suggests that teacher modeling practices has a positive significant effect on pedagogical competence.

5. Conclusion

Teacher modeling emerges as a multifaceted approach to professional development, offering mentee teachers a blueprint for pedagogical excellence across various dimensions. The findings collectively underscore the integral role of TMP in promoting teacher pedagogical competence and PD within public secondary schools. TMP have a positive impact on various aspects of novice teachers' pedagogical competencies. Teacher modeling practices help the mentee teachers to develop positive pedagogical competencies with a positive impact on learner outcomes. Teacher modeling as a mentorship practice is therefore a critical component in enhancing novice teachers' pedagogical competence in schools

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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