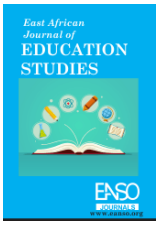

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Original Article

Influence of School Environment on Physics Teacher Effectiveness in Kigezi Sub-Region, Uganda

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School Environment, Collegiality, Administrative Support, Professional Development, and Teacher Effectiveness.

ABSTRACT

This study investigated the influence of school environment on physics teacher effectiveness in secondary schools in Kigezi Sub-region, Uganda. The focus of the study was to establish the influence of administrative support on physics teacher effectiveness; to establish the influence of collegiality of teachers on physics teacher effectiveness and to find out the influence of professional development like workshops, seminars on physics teacher effectiveness. This study employed both quantitative and qualitative techniques to collect and sequentially analyse the data. The study adopted a mixed research design on a sample of 234 physics teachers, fourteen (14) head teachers and six (06) education officials. Data were collected using a self-administered questionnaire, interview guide, focus group discussions and classroom environment checklist. Quantitative data was analysed through the statistical software programs SPSS and SPSS AMOS while qualitative data was analysed using content analysis and verbatim quotations. Descriptive analysis showed that the school environment highly influences physics teacher effectiveness in all aspects. The results of structural equation model (SEM) showed that the school environment influences teacher effectiveness. The findings showed that the school environment as conceptualised as administrative support, collegiality and professional development had a strong positive influence on teacher effectiveness. It was concluded that teachers should create appropriate environment to present new thoughts by creating standards of administrative support, exercise companionship and cooperation between colleagues. Finally, develop professionally and remain relevant with current skills by participating in activities like educational seminars, workshops, and conferences.

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INTRODUCTION

Exceptionally effective teachers in education system are paramount because they substantially improve skills, values, attitudes, and the students' academic knowledge (Laraib, 2014; Muijs & Renold, 2011). Effective teachers are essential for science subjects particularly physics which has witnessed dismal performance. Additionally, science, mathematics and technology related courses are important in driving industrialisation (MOES, 2006). Globally, the challenge of teacher effectiveness is still pronounced. In Western World countries, the concern has been about teacher ineffectiveness. For instance, around 1960 in USA, the issue of teacher ineffectiveness became a major concern and there were increased demands for accountability from teacher about the performance of students and to clear the problem about ineffective teachers that was a challenge to the education department for some time and a hot debate in many states. Therefore, to improve the status quo, policy makers thought of designing suitable evaluation system to cater for student assessment data as well (Mathesz, 2014).

In Sub- Saharan secondary schools, teacher ineffectiveness has also been a common problem. According to secondary schools in Nigeria, a number of setbacks have affected teachers' effectiveness, and these have reduced the achievement expected of an average learner. Some examples of the setbacks that have challenged teacher education in Nigeria include; teachers' professionalism, social-economic and political environments, quality, and quantity of personnel (staff), instructional and infrastructural resources (Banda, Ariffin & Nordin, 2020). Its developmental goals in the context of industrialisation, self-sustance and application of technology require quality science, mathematics and technological education (MOES, 2006). According to Uganda National Commission for United Nations Educational, Scientific and Cultural Organisation (UNESCO) (2017) report, indicated that the general performance of science subjects and in particular physics has been poor in developing countries. Uganda National Examinations Board (UNEB) reports for Uganda Certificate of Education (UCE) (2018, 2019 and 2020) link this poor performance to teachers' ineffectiveness because of theoretical handling of science subjects. Accordingly, teachers of science handle sciences theoretically without hands-on and minds - on approaches applied for students (Fauth et al., 2019). In view of this, the study sought to establish if the school environment (collegiality of staff, administrative support by heads of schools and professional development through trainings) introduced have an influence on physics teacher effectiveness and more so on skills of teachers handling science subjects at the Uganda Certificate of Education level, in Kigezi Sub-region.

To solve the problem of teacher ineffectiveness in science subjects, the government, in 2005 introduced the Secondary Science and Mathematics Teachers (SESEMAT) programme, a programme to spearhead all the refresher courses for in-service science teachers. The programme started to enhance teaching effectiveness of science teachers with the general conviction in government circles that science and technology are the springboard of economic growth and development (Government of Uganda, 1992). This belief is rooted in the Education white paper of 1992, which stressed the possible role of science and technology in

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boosting development (Black & William, 2003). The SESEMAT programme is an in-service training programme (INSET) of serving teachers of Mathematics and Science in secondary schools in Uganda (MOES, 2006; Komakech & Osuu, 2014). This is because effective science and mathematics teaching requires understanding the learners' needs so that teachers can support them (MOES, 2006; Komakech & Osuu, 2014).

Despite the implementation of SESEMAT, the Basic Education Statistics of Uganda (BES) (2019) report showed a declining trend in performance of students in Physics in secondary schools between 2002 and 2015 (MOES, 2016). In addition, the Uganda Certificate of Education (UCE) results from 2005 to 2015 released by Uganda National Examinations Board (UNEB) every year show that the pass rate of physics subject had never exceeded 50% (Ahimbisibwe, 2015). According to UNEB results for UCE 2016, 2017 and 2018, students' performance in sciences were poor. This casts a lot of doubt on the significance of the SESEMAT programme on enhancing teacher effectiveness, hence, the need for this study in particular to investigate the influence of school environment on physics teacher effectiveness.

Objective of the Study

- To establish the influence of administrative support on physics teacher effectiveness in Kigezi Sub-Region.
- To establish the influence of collegiality on physics teacher effectiveness in Kigezi Sub-Region.
- To find out the influence of professional development on physics teacher effectiveness in Kigezi Sub-Region.

Hypotheses of the Study

H_{oa} There is no significant influence of administrative support on physics teacher effectiveness in Kigezi Sub-Region.

H_{ob} There is no significant influence of collegiality on physics teacher effectiveness in Kigezi Sub-Region.

H_{oc} There is no significant influence of professional development on physics teacher effectiveness in Kigezi Sub-Region.

LITERATURE REVIEW

Theoretical Review

The social ecological systems theory profounded by Bronfenbrenner's in 1977 provided the theoretical underpinnings for this study on school environment. Bronfenbrenner's Social ecological systems theory focuses on the quality and context of the student's environment. In this case, the context of the students' environment includes school and work place. The theory calls it a complex environment system where people dwell and work. Bronfenbrenner (1977) looks at the environment where teachers work and is able to help learners learn and regulate their behaviour. Bronfenbrenner's ecological systems theory is relevant simply due to composite arrangement in which institutions exist. In addition, the theory is important simply because it looks at actions and reactions of a child to other people in the microsystem that will affect how they treat the child in return. This theory helped to explain how school environment influenced physics teacher effectiveness in Kigezi Sub-region, Uganda.

Empirical Review

Administrative Support and Teacher Effectiveness

Administrative support is an approach where school administrators' informal support contributes to the success of teachers by ensuring that they are effective and productive. It has been frequently identified as the most important factor influencing teachers' employment decisions. The administrative support performs and facilitates execution of administrative activities and procedures for the operation of an office or facility. Further, administrative support is a trusted partner by supporting administrative school management matters and activities.

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Several studies were conducted on variables of administrative support and teacher effectiveness. For instance, Erturk (2021) conducted a study to determine the relationship between school administrators' supportive behaviours and teachers' job satisfaction. The results indicated there is positive and highly significant relationship between informational support and teachers' job satisfaction. Furthermore, results showed that supportive behaviours of school administrators significantly impact teachers' job satisfaction and well-being.

Susan (2014) examined the construct of the relationship between administrative support and teacher efficacy. The findings indicated that administrative support positively impacts teachers' efficacy. Adamu and Gelengu (2022) carried out a study to determine the influence of school administrators on teachers' performance. The findings revealed that assigning duties to teachers' influence teacher performance. Eyiene et al. (2021) examined the relationship between administrators' competence and teachers' job effectiveness. The results indicated that administrators' leadership competence (supervisory competence, communication, and involvement of teachers in decision-making competence) significantly related to teaches' job effectiveness.

Ngonzi(2020) assessed the influence of principals' administrative role on teachers' job performance. The findings revealed a significant influence of principals' supervisory role on teachers' job performance. Nevertheless, while the above studies give a hint on the existence of an influence of administrative support on teacher effectiveness, literature search revealed that limited empirical studies had been carried out on the variables and non in the context of Kigezi Sub-Region, Uganda. This study tested whether H_{oa}: There is no significant influence of administrative support on physics teacher effectiveness in Kigezi Sub-Region.

Collegiality and Teacher Effectiveness

Collegiality is a state, where staff develop companionship and cooperation among themselves to share responsibility and authority (Austin, Sarcinell & and MCDaniel, 2007). Further according to Austin, Sarcinell & and MCDaniel (2007), collegiality is defined as community, respect, values of peers and their work, concern for colleagues, highly valued peer interaction and a feeling of belonging. In addition, strong and healthy collegial relationships among school teachers is regarded as an essential component of a school effectiveness and teacher enhancement (Shah, 2012). Tamooh etal. (2020) made an investigation on relationship between teachers' collegiality and academic performance of primary school pupils in Kenya. The findings indicated that collegiality had a positive relationship with academic performance. Kimeto and Cheboi (2021) conducted a study to establish the effects of teacher collegiality on learners' academic performance in schools in Kenya. The findings indicated that teachers collegiality influences learner academic performance.

Quines and Montez (2023) carried out a study to determine the mediating effect of teacher collegiality on the relationship between instructional leadership and professional development of teachers. He found out that there is a very high level of mean scores for teacher collegiality, instructional leadership, and professional development of teachers. In addition, it was also found out that there are significant relationships between instructional leadership and between teacher collegiality and professional development. Kamar and Matazu (2018) investigated the effect of collegial teaching strategy on academic performance and retention of science concepts in Sokoto, Nigeria. The findings showed that there is significant difference between the academic performance of students in experimental and control groups in favour of experimental group. The literature above suggests that there is an influence of collegiality on teacher effectiveness. However, the studies above raise the contextual gap, as no

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study has been carried out in the context of Kigezi Sub-Region, Uganda. Thus, this study tested H_{0b}: There is no significant influence of collegiality on physics teacher effectiveness in Kigezi Sub-Region.

Professional Development and Teacher Effectiveness

Professional development is the turning point of quality education (Quines & Montez, 2023). Majority of the teachers are challenged and requested to strengthen their subject knowledge base, pedagogical content knowledge and teaching skills. Teacher professional development has been recognised globally as one of the most important elements required for increasing teachers' knowledge and skills and improving students' learning (Akpem, Tatteh & Adom, 2021). Therefore, professional development leads to teacher effectiveness. There are scholars who have related professional development and teacher effectiveness. For example, El Afi (2019) examined the impact of professional development on teachers' performance in United Arab Emirates. He observed that there an improvement of teachers' lessons planning, teaching methods, teaching tools, classroom management and cooperation after the profession development.

Akepm, Tetteh and Adom (2021) examined the influence of teacher professional development on teaching and learning in public technical institutes in Ghana. The findings showed that professional development have a highly significant positive relationship with teacher performance. Desmone et al. (2012) examined the effects of professional development on teachers' instruction. The observed that professional development increases teachers' use of instructional practices in the classroom. However, as the studies suggest, they were all done outside Kigezi Sub-Region, Uganda. This this study test the hypothesis H_{0c}: There is no significant influence of professional development on physics teacher effectiveness in Kigezi Sub-Region.

METHODOLOGY

Research Approach and Design

This study employed both quantitative and qualitative techniques. Combining qualitative and quantitative research approaches was desirable because the qualitative approach enables an in-depth analysis of phenomena and provides the means whereby data on multiple realities could be examined. On the other hand, the quantitative approach yields data that not only supplements and confirms findings from the qualitative approach but also helps establish whether they could be generalised to the whole group.

This study adopted a mixed methods research design to provide answers to different research question and hypothesis (Creswell, 2018). This was because the objective and hypothesis required a combination of quantitative and qualitative research approaches where no single approach could manage the study.

Participants

The sample size was determined by using Krejie and Morgan Table, where the population of 746 corresponds to 254, as the sample size used.

Participants in the study were as follows:

Table 1: Sampling frame

Category of respondents	Population	Sample	Sampling techniques
District Education Officials	06	06	Purposive sampling
Head Teachers	185	14	Purposive sampling
Physics Teachers	555	234	Simple random sampling
Total	746	254	

Source*: Primary data (*2020*)*

Instruments

The study used self-administered questionnaire (SAQ) for teachers. The teachers responded by writing or putting 1, 2, 3 ,4, 5 on the relevant response out of five alternatives provided. A 5-point Likert scale was to be answered as follows

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;1 for strongly disagree (SD), 2 for Disagree (D), 3 for Not Sure (NS), 4 for Agree(A) and 5 for strongly agree (SA). Choice of questionnaires were based on the fact that they give standard questions, uniform answers, easy to distribute, can be filled at ease, are time saving, eliminate interview bias and create greater anonymity (Creswell, 2018). Other tools used included:

Interview Guide

The researcher used An interview guide to get respondents' opinions who were head teachers about the issues like working together as staff, whether teachers are supported by the administrators and whether teachers improve on their professional development.

Focus Group Discussion (FGD)

The researcher conducted a focus group discussion (FGD) to establish the attitudes, beliefs, opinion, or ideas about the study. A focus group discussion involves gathering people from similar backgrounds or experiences together to discuss a specific topic of interest (Creswell, 2018).

Classroom Environment Checklist

The classroom environment checklist was a set to guide the researcher on what happens in a real classroom environment. The instrument checked 12 schools both government and private. Through the checklist, first-hand information about the positive learning environment were collected, whether clearly communicated expectations related to instruction and behaviour are there in the class. The researcher opted for this tool because it provides additional information and instant feedback. The reliability of the instrument for the various constructs was tested using Cronbach's Alpha (α). Reliabilities for the items for the different constructs were registered at α =0.70 above. Validity and reliability results are presented in section of results.

Data Analysis

Quantitative and Qualitative Data Analyses

Quantitative analysis involved descriptive and inferential analyses. Descriptive analysis of the school environment's influence on teacher effectiveness involved calculating frequencies, percentages and means using SPSS and SPSS AMOS. Data from interviews, observations, and FGD were analysed in themes; from each item, responses were grouped into key themes, and later interpretations were done. Creswell (2018) essentially guided the method of analysis. Verbatim quotations were also used where necessary.

RESULTS

School Environment and Teacher Effectiveness

Administrative Support

Five questionnaire items were used to measure whether a good classroom environment was important for ensuring teacher effectiveness, in which case administrative support is an indicator. *Table 2* shows that about 60% of the respondents agreed with respect to administrative support as one of the indicators. In addition, the mean is 4.24 implying normality despite. The value of the mean suggests good administrative support under school environment, which may influence teachers' effectiveness. The small standard deviation of about 0.65 (65%) suggests small dispersion from the common view of the respondents. This implies that administrative support influences teacher effectiveness.

Majority of the heads of departments that participated in the focus group discussion expressed that schools do not support teachers to take on professional development or refresher programs. This implied that some schools had many physics teachers that had not attended SESEMAT training, making the few that had trained find complications in implementing the practices. Some struggle on their own. It was also clear that even the few schools that try to facilitate

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their teachers for SESEMAT training still do not give them enough support for its implementation.

The head teachers were interviewed in relation to the influence of school environment on physics teacher effectiveness. The head teacher's responses showed that the school administration was not in a position to regularly support the teachers by providing equipment due to limitations in finances. Secondly, most school head teachers showed that the schools did not have an established reward and recognition system in place. Without such systems the administrative function of motivating teachers to perform can never be operationalised. Other headteachers confessed that their teachers do not get enough materials to use. Some headteachers who were interviewed had this to say;

> *"……hahaha……eeeee materials given to teachers while conducting lessons are not enough"*

Table 2: Respondents opinion on administrative support

Statements	A	SA	NS	D	SD	Mean	S.D
I feel I have supportive administration	116 (59.8)	74 (38.1)	1 (0.5)	1(0.5)	2 (1.0)	4.34	0.62
I value principal communication	122 (62.9)	62 (32. 0)	3 (1.5)	3(1.5)	4 (2.1)	4.21	0.74
I feel like the whole staff is recognized	116 (59.8)	69 (35.6)	5 (2.6)	2(1.0)	2 (1.0)	4.28	0.66
I feel generally satisfied with the situation	131 (67.5)	49 (25.3)	9 (4.6)	3(1.5)	2 (1.0)	4.14	0.66
I see that the school is well run	140(72.2)	52(26.8)	2(1.0)	0(0.0)	0(0.0)	4.24	0.55
Mean						4.24	0.65

N=194: A (Agreed); SA (Strongly Agree); NS (Not sure); D (Disagree); SD (Strongly Disagree); S.D (standard deviation)

Source: Primary Data 2021

Collegiality

Physics teachers' perceptions regarding collegiality amongst staff was examined using six items with strongly disagree and strongly agree at the extreme points of the Likert Scale. Data analysis in *Table 3* revealed that physics teachers generally agree that collegiality amongst staff meet their expectations. Whereas a smaller percentage of about 5% of physics teachers are in disagreement. From *Table 3*, the mean is 4.20 showing normality. The value of the mean suggests good school environment (collegiality), which may influence teachers. The small standard deviation of about 0.74 (74%) suggests a relatively higher dispersion from the common view of the respondents. This implies that the cooperation and companionship between teachers who share the same responsibility influences teacher effectiveness.

During a Focus group discussion, teachers raised an issue of uncooperative behaviours amongst physics teachers. Majority of the teachers confirmed that there was no cooperation amongst fellow physics teachers. Teachers showed that most schools create a competitive culture among teachers. This reduces the chances of cooperating and planning together to support one another during planning or teaching.

Under the theme collegiality, factors that are related to collegiality were placed and presented as follows;

Eighty five percent (85%) of the head teachers expressed that their staff did not share similar beliefs on performance of physics. Having differing beliefs makes it hard to focus on the same goal. This explains as to why physics performance in Kigezi Sub-Region is still low despite the SESEMAT training the teachers have obtained over the years. From the interviews, the headteachers expressed that teachers never plan together. This affects the collegiality principle on which the SESEMAT pedagogical approach

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model is built. This means that the teachers cannot effectively implement the model and thus explain why students in Kigezi Sub-Region have continued to perform poorly in physics despite the teacher training.

In the interviews, the head teachers showed that the school has one physics teacher at a time in most cases. Yet the collegiality principle is built on teachers working collectively in teams, strengthening what they are doing. So, in the case of Kigezi Sub-Region, teachers mostly work alone even when there is more than one teacher at school. Breaching this principle of collegiality explains why students in Kigezi Sub-Region continue to perform poorly.

Head teachers about ten (10), revealed that 70% of the teachers have internal friction at departmental and subject level. With these fights, head teachers expressed that the teachers are not able to encourage and support each other effectively. This bleaching of the collegiality element explains as to why the physics teachers in Kigezi Sub-Region continue to underperform despite the call by government to work together jointly.

The head teachers nine (09), revealed that physics teachers are usually divided along religious and or ethnical lines. This affects their ability to plan and work together effectively as a team. This shows that they are unable to meet the fundamental principles of working together and thus the reason to why despite the trainings physics teachers in Kigezi Sub-Region continue to underperform.

Table 3: Descriptive statistics on collegiality

Collegiality	A	SA	NS	D	SD	Mean	S.D
I really feel staff shares beliefs	127 (65.5)	42 (21.6)	14 (7.2)	6 (3.1)	5 (2.6)	4.01	0.80
I feel that I am valued in the Physics department	126 (64.9)	62 (32.0)	3 (1.5)	1 (0.5)	2 (1.0)	4.26	0.62
I feel I do see Physics teachers working together	114 (58.8)	69 (35.6)	1 (0.5)	5 (2.6)	5 (2.6)	4.22	0.81
I see planning together in a department a waste of time	114 (59.8)	62 (32.0)	4 (2.1)	7 (3.6)	5 (2.6)	4.15	0.84
I feel a head of physics department advising colleagues about school goals encouraging	116 (59.9)	74 (38.1)	3 (1.5)	3 (1.5)	1.0	4.34	0.62
I find teachers respecting one another encouraging	122 (62.9)	62 (32.0)	3 (1.5)	3 (1.5)	4 (2.1)	4.21	0.74
Mean						4.20	0.74

N=194: A (Agreed); SA (Strongly Agree); NS (Not sure); D (Disagree); SD (Strongly Disagree); S.D (standard deviation)

Source: Primary Data 2021

Professional Development

Table 4 reveals that over 60% of the physics teachers pointed out that it is relevant for teachers to be given chance for training for the work-related activities. This is because it improves teachers' effectiveness. According *Table 4*, the mean is 4.24 implying normality in addition over 60 % of the teachers generally agree that professional development influences teachers. The value of the mean suggests good school environment (professional development), which may influence on teachers. The small standard deviation of about 0.63 (63%) suggests small dispersion from the common view of the respondents. This implies that professional development influences teacher effectiveness.

Attendance of the refresher courses was realised in many schools but on their return to schools, teachers do not implement what was studied from the course. Only two out of twenty physics teachers were seen applying most of the pedagogical approaches while the lesson was on going. This implied that only 10% of the trained teachers were practising the approaches and skills that they acquired during the training.

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Over 75 % of the head teachers that were interviewed expressed that the schools did not have adequate funds to support teachers when opportunities for professional development arise. With little continuous training the teachers sometimes lose the quality of skills they acquired.

In schools where the school was in position and willing to finance teachers for a training, 85% of teachers were not in full attendance for the training due to many commitments. This leads them to miss skills that would help them teach better physics. Other head teachers who were interviewed revealed that schools lack enough resources and the training they organise is usually of low quality, which affects the results grossly. These breaches the building blocks of the essential approaches in teaching sciences and hence explains as to why teachers of physics in Kigezi Sub-Region are not effective.

Table 4: Respondents' opinion on professional development

Statements	A	SA	NS	D	SD	Mean	S.D
I see enough opportunities for professional development	131 (67.5)	49 (25.3)	9 (4.6)	3 (1.5)	2 (1.0)	4.14	0.66
I feel I am given a chance to get training for work related activities	140 (72.2)	52 (26.8)	0(0.0)	0 (0.0)	2 (1.0)	4.24	0.55
I see myself on the list of staff going for a workshop	104 (53.6)	87 (44.8)	1(0.5)	0 (0.0)	2 (1.0)	4.41	0.62
I feel the department usually organizes in house trainings	116 (59.8)	52 (35.6)	4(2.1)	2 (1.0)	3 (1.5)	4.27	0.70
I feel encouraged when I see my department with enough sources to enable me work up to optimum level of my abilities	132 (68.0)	49 (25.3)	9(4.6)	2 (1.0)	2 (1.0)	4.15	0.64
Mean						4.24	0.63

N=194: A (Agreed); SA (Strongly Agree); NS (Not sure); D (Disagree); SD (Strongly Disagree); S.D (standard deviation)

Source: Primary Data 2021

Teacher Effectiveness

Effective Communication

Table 5 shows seven items that were employed to assess physics teachers' improvement in effective communication. Data analysis reveals that all the items answered by physics teachers show agreement percentage ranging between 50% to 60%. *Table 5* shows that the mean is 3.60 suggesting a normality. In addition, the value of the mean suggests a fair rating based on the Likert scale. The small standard deviation of about 0.92 (92%) suggests small dispersion from the common view of the respondents. This implies that effective communication is an indicator of teacher effectiveness.

Through the interviews that were administered, head teachers were asked whether physics teachers effectively communicate while in class teaching. Out of 14 head teachers who were interviewed, 3 head teachers had this to say;

> *"Yes yes please……true! Simply because whenever, I happen to pass near the class… I hear the teacher of physics talking loudly.*

Other head teachers said that sometimes, when questions are set while a teacher is delivering, yes, many students raise hands. Other head teachers are not sure because they usually hear nothing coming out of their classrooms wondering whether it is a method when teaching physics. This implies that teachers need to be consistent in talking loudly to learners while teaching. Furthermore, other head teachers were asked whether teachers of physics are well equipped. The response is as follows; six of the head teachers replied that, teachers from rural schools just give notes, no explanation at all. Other head teachers, eight of them, said that educational

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institutions need to double their efforts as teaching of physics is concerned.

Table 5: Respondents' opinions on effective communication

Statements	A	SA	NS	D	SD	Mean	S.D
I feel audible enough when handling physics	106 (54.6)	76 (39.2)	2 (1.0)	9 (4.6)	1 (0.5)	4.27	0.75
I feel giving immediate feedback during the lesson encouraging	118 (60.8)	64 (33.0)	1 (0.5)	8 (4.1)	3 (1.5)	4.20	0.78
I feel I need language fluency while teaching physics	104 (53.6)	58 (29.9)	6 (3.1)	20 (10.3)	6 (3.1)	3.97	1.01
I feel my non-verbal clues confuse students when teaching	55 (28.4)	12 (6.2)	32 (16.5)	65 (33.5)	30 (15.5)	2.76	1.20
I see delivering physics with a smile effective	115 (59.3)	68 (35.1)	5 (2.6)	5 (2.6)	1 (0.5)	4.26	0.68
I feel physics concepts do not need a lot of explanation	16 (8.2)	4 (2.1)	3 (1.5)	107 (55.2)	64 (33.0)	1.91	0.93
I feel guilty if I do not answer all the questions of my students	108 (55.7)	48 (24.7)	1 (0.5)	26 (13.4)	11 (5.7)	3.80	1.13
Mean						3.60	0.92

Source: Primary data 2021

Subject Matter Expertise

Table 6 reveals that physics teachers' level of agreement on subject matter expertise for a well-prepared lesson was about 60% across the five items. Further *Table 6* shows the mean which is 4.29, implying normality. The value of the mean suggests good subject matter expertise for teachers themselves. The small standard deviation of about 0.69 (69%) suggests small dispersion from the common view of the respondents. This implies that the respondents had similar ratings of themselves about subject matter expertise.

Table 6: Descriptive statistics subject matter expertise

Statements	A	SA	NS	D	SD	Mean	S.D
I feel one delivers well with a well-prepared lesson	93 (47.)	1 (0.5)	2 (1.0)	97 (50.0)	1 (0.5)	4.46	0.60
I feel I do not know the subject matter of my subject well	116 (49.)	62 (32.0)	4 (2.1)	7 (3.6)	5 (2.6)	4.15	0.84
I feel I am not an expert in my subject	116 (59.)	74 (38.1)	1 (0.5)	1 (0.5)	2 (1.0)	4.34	0.62
I feel I am a subject matter expert	122 (62.)	62 (32.0)	3 (1.5)	3 (1.5)	2 (2.1)	4.21	0.74
I feel I am able to teach many subjects	116 (59.)	69 (35.6)	5 (2.6)	2 (1.0)	2 (1.0)	4.28	0.66
Mean						4.29	0.69

Source: Primary data 2021

Professional Competence

Table 7 indicates that majority of the respondents, about 65%, agreed with the influence of professional competence attained. However less than 10% expressed disagreement on same items. From *Table 7*, the mean is 4.29 implying normality. The value of the mean suggests good professional competence for teachers themselves. The small standard deviation of about 0.61 (61%) suggests small dispersion from the common view of the respondents. This implies that the respondents had similar ratings of themselves concerning subject matter expertise.

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For the issue of teachers' professionally competent, many head teachers said No, because majority do not prepare lessons, they just enter into a lesson and dictate notes only. One head teacher commented that it is through struggle for teachers to make a scheme of work. Others are rebellious. This implies without lesson plan or schemes of work, teachers do not think clearly and specifically about the learning, they wish to occur in a lesson.

Table 7: Descriptive statistics professional competence

Statements	A	SA	NS	D	SD	Mean	S.D
I feel I am dedicated to my work	131 (67.5)	49 (25.3)	9 (4.6)	3 (1.5)	2 (1.0)	4.14	0.66
I feel I am handling my job according to the work ethics	140 (72.2)	52 (26.8)	0 (0.0)	0 (0.0)	2 (1.0)	4.24	0.55
I believe I am passionate about the work in my profession	104 (53.6)	87 (44.8)	1 (0.5)	0 (0.0)	2 (1.0)	4.41	0.62
I feel when it comes to marking students, I exhibit a sense of integrity	116 (59.8)	69 (35.6)	4 (2.1)	2 (1.0)	3 (1.5)	4.27	0.70
I always try to be fair to my colleagues	117 (60.3)	74 (38.1)	1 (0.5)	1 (0.5)	1 (0.5)	4.35	0.58
I feel I am able to show positive role model to the rest of the school	117 (60.3)	74 (38.1)	1 (0.5)	1 (0.5)	1 (0.5)	4.35	0.58
Mean						4.29	0.61

Source: Primary Data 2021

Teaching Style

Six questionnaire items were prepared and used to capture the key teaching style information. *Table 8* shows that majority (above 50%) of the respondents agreed concerning the method of teaching style. *Table 8* shows that the mean is 4.08 implying normality. The value of the mean suggests good teaching style for teachers themselves. The small standard deviation of about 0.77 (77%) suggests small dispersion from the common view of the respondents. This shows that the respondents had similar ratings of themselves concerning teaching style used.

According to classroom observations, no formal lesson preparations were generally seen in most of the schools with a few exceptions in some private schools. Even those teachers that had prepared lessons, they did it for formality but did not follow their lesson plans.

Table 8: Descriptive statistics for teaching style

Statements	A	SA	NS	D	SD	Mean	S.D
I feel the ability to explain complicated material well	129 (66.5)	54 (27.8)	9 (4.6)	0 (0.0)	2 (1.0)	4.20	0.62
I feel student-centred method as the only best teaching approach for physics practical	106 (54.6)	58 (29.9)	5 (2.6)	22 (11.3)	3 (1.5)	4.00	0.96
I usually use flexible instructional style in my class	133 (68.6)	59 (30.4)	1 (0.5)	0 (0.0)	1 (0.5)	4.28	0.54
I feel a lesson becomes more effective when using instructional equipment only in physics	80 (41.2)	36 (18.6)	8 (4.1)	47 (24.2)	23 (11.9)	3.30	1.34
I know while teaching, one needs to integrate values in his/her lessons	129 (66.5)	60 (30.9)	2 (1.0)	2 (1.0)	1 (0.5)	4.26	0.58
I see showing love for the subject one teaches is encouraging	101 (52.1)	91 (46.9)	0 (0.0)	0 (0.0)	2 (1.0)	4.44	0.61
Mean						4.08	0.77

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Source: Primary data 2021

Class Management

Table 9 shows that respondents rated their classroom management style highly, as shown by their frequency. Generally, respondents above 50% agreed with classroom management style. The mean is 3.52 implying normality and in addition the value of the mean suggests good classroom management style for teachers themselves. The small standard deviation of about 0.75 (75%) suggests small dispersion from the common view of the respondents. This implies that the respondents had similar ratings of themselves concerning classroom management style applied.

Table 9: Descriptive statistics class management

Statement	A	SA	NS	D	SD	Mean	S.D
I am liked because of maintaining students on task behaviour	111 (57.2)	43 (22.2)	30 (15.5)	8 (4.1)	2 (1.0)	3.95	0.80
I am hated because I always talk about ways of maintaining discipline in my class	39 (20.1)	11 (5.7)	31 (16.0)	66 (34.0)	47 (24.2)	2.49	1.22
I am covered by students because I feel rewarding good behaviours	86 (44.3)	24 (12.4)	43 (22.2)	24 (12.4)	17 (8.8)	3.39	1.12
I usually discourage students not to yell at other students	108 (55.7)	48 (24.7)	6 (3.1)	25 (12.9)	7 (3.6)	3.85	1.05
I always talk about academic giants as those who model positive behaviours amongst their friends	119 (61.3)	46 (23.7)	8 (4.1)	13 (6.7)	8 (4.1)	3.94	0.96
Mean						3.52	1.03

N=194: A (Agreed); SA (Strongly Agree); NS (Not sure); D (Disagree); SD (Strongly Disagree); S.D (standard deviation)

Source: Primary data 2021

Table 10: Summary of major categories and minor categories identified in qualitative interview

Themes	Major category	Minor category
Administrative support	Teachers have a lot of work which compromises their teaching.	Schools are not managed well.
	Head teachers rarely support teachers. Materials to use are not regularly supplied	Fewer materials bought
Collegiality	Teachers/ staff do not plan together.	Internal conflicts
	Teachers of physics are limited. Teachers do not support or encourage one another.	
Professional development	Not enough funds to support teachers.	Teachers have many commitments, hence miss trainings.
	Refresher courses not organised by head teachers.	Lack of enough resources.

School Environment and Physics Teacher Effectiveness Structural Path model and Hypothesis Testing

In *Figure 1***,** the full structural path model for school environment and teacher effectiveness was illustrated to test the study's three hypotheses (H0a – H0c). From *Figure 1* and *Table 11*, the regression weights for the causal paths were found to be statistically significant and relevant. As reflected in *Figure 1* results indicate a positive and statistically influence of the administrative support, collegiality, and professional

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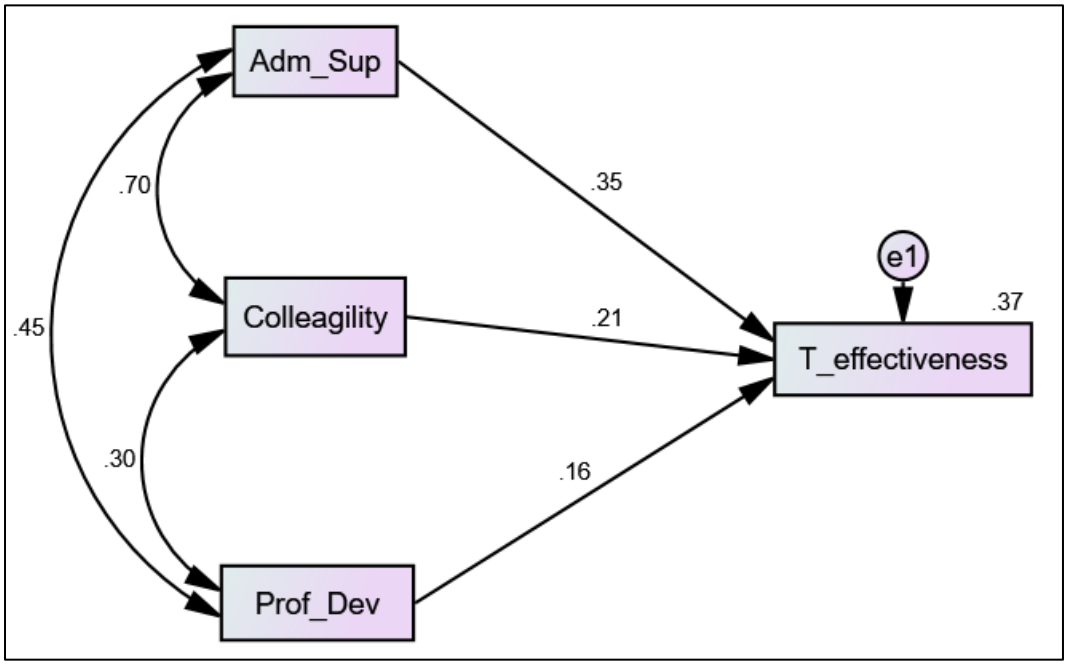
development on physics teacher effectiveness. In that respect, the influence of administrative support on teacher effectiveness (T_effectiveness <---Adim-Sup yielded β = 0.351, p < 0.001; the influence of collegiality on teacher effectiveness (T_ effectiveness <--- collegiality) was β = 0.215, p < 0.007 and lastly, professional development on physics teacher effectiveness (T_effectiveness <-- Prof-Dev) was at β = 0.157, p < 0.015. Thus, all the three (H_{0a} – H_{0c}) were not supported instead alternative hypotheses were accepted in view of statistically significant results. *Figure 1* further reveals that 37% of physics teacher effectiveness with school environment could be estimated by using the exogenous constructs of administrative support, collegiality, and professional development on the influence of school environment on teacher effectiveness.

Figure 1: School environment and teacher effectiveness structural model



Source: Primary data 2022

Table 11: Regression Weights: (Group number 1 - Default model)

Structural Path			Estimate	S.E	C.R	R	Results
T_effectiveness	<---	Adm_Sup.	.351	.077	4.102	.001	Significant
T_effectiveness	<---	Collegiality	.215	.062	2.688	.007	Significant
T_effectiveness	<---	Prof_Dev.	.157	.060	2.432	.015	Significant

T_effectiveness; Teacher effectiveness; Adm_Sup; Administrator support; Prof_Dev; professional development.

DISCUSSION

The results for the first hypothesis (H_{0a}) to the effect that there is an influence of administrative support on teacher effectiveness, indicated that the influence was positive and significant. This finding was consistence with the findings of Susan (2014), who established the existence of a strong connection between administrative support and teacher efficacy. Relatedly, Adam and Gelengu (2022) indicated that proper assigning of duties to teachers' influence teachers' performance. Similarly, Eyiene et al. (2021) reported that administrators' leadership competences improve teachers' job effectiveness. Also, Ngonzi (2020) revealed that the principles' administrative role influences teacher job performance. With respect to second hypothesis (H_{0b}), stating that collegiality influences teacher effectiveness, the results showed that the influence was positive and significant. This finding is supported by Tomooh etal. (2020),

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found out that collegiality had a positive relationship with performance. Also, Kimeto and Cheboi (2021) revealed that collegiality influences learner academic performance. Quines and Montez (2023) reported that there is relationship between teacher collegiality and professional development. The results for third hypothesis (H_{0c}) to the effect that there is an influence of professional development on teacher effectiveness also revealed that the influence is positive and significant. This finding concurred with the findings of El Afi (2019) who reported that there is improvement of lesson planning, teaching methods, classroom management after professional development. Also, Akepm, Tetteh and Adam (2021) found that professional development has a significant positive relationship with teacher performance. Desmone et al. (2021) reported that professional development increases teachers use of instructional practices in the classroom. Therefore, professional development has a positive significant influence on teacher effectiveness.

Headteachers who were interviewed revealed that teachers of science and in particular, physics no longer help each other, plan together. This is simply because most science teachers have more than one school, which cannot allow them enough time to rest in one school.

CONCLUSIONS

A change in collegiality, administrative support, and professional development as indicators of a school environment cause a change in improvement in teacher effectiveness. Therefore, school environment plays a crucial role in improving physics teacher effectiveness.

Recommendation

Based on the findings, the study recommends that for physics teacher improvement, school environment should be improved.

District education office should revive inspections and publish guidelines that will compel administrators at school level to support their teachers.

In order to improve school environment, teachers should create appropriate environment to present new thoughts, in this case create standards of administrative support, exercise collegiality and professionally develop skills, values in attending activities like related to seminars, workshops and conferences.

The limitations of the current study are that it considered few indicators of school environment that is collegiality, administrative support and professional development. Therefore, future studies should cover other indicators namely facilities, school-based health supports and disciplinary policies and practices for immediate feedback and improvement in schools. Considering different indicators of school environment will help in establishing the influence of school environment on teacher effectiveness. The practical contribution of this study is that it developed a model indicating that school environment comprises of administrative support, collegiality, and professional development as key indicators for promoting teacher effectiveness.

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