

The Effect of Training on Pedagogical Content Knowledge on Teachers' Performance in Nakuru County, Kenya

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Abstract: The purpose of this study is to find out the effect of training on pedagogical content knowledge on teachers' performance; in schools within Nakuru North Sub-County, Kenya. The study was carried in the 22 public primary schools in the sub county among the 22 head teacher and 170 school teachers. The study was based on Campbell's theory of performance and social cognitive theory. A sample of 8 head teachers and 51 public primary school teachers was used. The sample for the head teachers was selected using purposive sampling technique while that of the head teachers was selected using simple random sampling technique. Data for the study was collected by use of questionnaires for teachers and interview schedules for head teachers respectively. Prior to use, the questionnaires were subjected to validity checks and reliability tests. Data collected was analyzed using descriptive statistics (frequencies, means and percentages) and inferential statistics with the aid of the Statistical Package for Social Sciences computer software version 21. Pearson moment correlation (r) was used to establish the relationship between the variables. There was a positive Pearson correlation between Training on Pedagogical Content Knowledge and Teachers' Performance ($r = -0.37, p = 0.802$). The study established that the school management and the Ministry of Education will be able to use these findings in formulating appropriate strategies that help enhance teacher performance through their continuous professional development.

Keywords: Training, Pedagogical content knowledge, teachers' performance.

INTRODUCTION

In the world today, there is demand for teachers who are effective, dynamic, and effective in the field of education. For pupils to develop effective communication, content of problem solving, collaboration and mastery of facing challenges in field of education [1]. Effective Continuous professional development (CPD) is an important determinant to teachers' learning and refining the pedagogies required in the teaching skills. This means that schools should focus much on enhancing teacher quality for this will in turn influence the teacher performance. In this study, teachers' performance is measured through effectiveness and efficiency in service delivery. However, studies on these aspects are scanty in developing countries [2]. Two main ways of teaching quality improvement for primary school learners in third world countries include improving incentives for teachers [3] and teacher continuous professional development (CPD) programs [4]. The key premise of organizational development is that schools are social systems that keep on changing [5].

In education, research has shown that teachers' performance is the determining factors on

pupils' achievement in education [6]. Darling-Hammond *et al.*, [7] define effective continuous professional development as structured professional learning that results in changes in teacher practices and improvements in pupils' learning outcomes. The researchers posit that effective continuous professional development bring most of the changes in teachers performance like content focused, includes active learning, provides coaching and expert support, supports collaboration, uses models of effective practice, offers feedback and the effect is sustainable for a long duration of time.

The fact that Kenya has made great headway and virtually wiped out untrained teachers from the public education sector cannot be slighted. CPD is in line with Kenya's Vision 2030 and the Sustainable development goal No 4, which emphasizes on inclusive and equitable quality and promotion of lifelong learning opportunities. However, the effect of CPD on teachers' performance is still not well understood. There is documented evidence of learners' performance at all levels in primary school education. According to the KNEC 2010 report, the standardized mean of 300, yet the achievement in reading and

numeracy was (297.58) and (295.6) respectively. Uwezo [8] showed that seven out of ten pupils in class three cannot do class two work and there was poor performance among lower primary school pupils in numeracy. In addition, of much concern is that, teacher education policies have failed to focus on ensuring that primary school teacher trainees acquire the knowledge, pedagogical skills and pedagogical content knowledge that they will need to help lower primary school students learn. With these in mind, it remains unclear how continuous professional development contributes significantly towards the performance of teachers' performance in public primary schools in country and more specifically in Nakuru North Sub County, considering limited research in the area.

According to the European Commission [9], the term Continuous Professional Development (CPD) is a wide range of developing through formal and informal activities for teachers, designed to address individual teachers' development needs and improve their professional practice. The activities are those done within the school such as team teaching, support for individual members of staff arising from performance management interviews, coaching, mentoring, and sharing good practice, lesson observation, and feedback. Whole-school development activities such as school networks, cross-school or virtual mentor networks, to share good practice, sharing effective practice, knowledge and skills through cross-local authority regional education consortia, courses, conferences, external activities such as accredited postgraduate study, international study visits and exchanges. There is no time limit, teachers can spend, or legal minimum requirement duration of CPD exercise, it can be done during working hours or outside working hours. As a consequence, CPD can take as long as a few hours and even stretch for several days or months. There are cases where the exercise can take the form of full or part-time studies over a defined period depending on the nature of program and certification required, in preparation for generally recognized qualifications. The statutory conditions of service for teachers require them to be available for work under the direction of the head teacher for 1,265 hours per year; including five days when the school is not open to pupils. Teachers need to be adequately equipped with the relevant skills to be able to deliver effectively in the stipulated hours.

According to Hayes [10], there are ranges of organizations that can have been given the responsibility for the organization and provision of CPD. CPD can be offered either internally by the schools themselves or externally by accredited institutions or individual professionals. Schools themselves - these provide training internally, through: days or sessions organized by individual head teachers; senior staff who provide professional guidance and development for their colleagues, schools choosing to

appoint teachers to 'leading practitioner' posts whose primary purpose is to model and lead the improvement of teaching skills. 'Leading' or 'lead' practitioners are paid on a separate pay range, higher than the ranges for classroom teachers and provide support to other schools in the local area through regional education consortium arrangements. This can also be conducted by Schools working with other schools in collaborative networks, Local authorities and the regional consortia providing local support for CPD through, for example, 'Professional Learning Hubs' to support schools in developing their leadership, Collaborative organisations, Private companies and the Governments through relevant education ministries.

Boyle *et al.*, [11] mentions the dynamism or fluidity of the teaching / learning environment in schools and stresses the necessity for CPD promotion in schools. This can also be attributed to the universality of international educational goals for instance, lifelong learning, life skills education, the universal basic education by 2015, , competency in the use of information communication and technology, and HIV/AIDS education, emotional intelligence,. Consequently, teachers experience new responsibilities and challenges that require acquisition of new skills, knowledge and new roles, thus, making CPD a necessity.

Ma'rufi, Budayasa and Juniati [12] carried out a study on teacher change, with a focus on what makes professional development effective. The researchers noted that school effectiveness and school improvements points out that professional development of teachers influences a school's effectiveness as well as learners' outcomes. However, the researcher noted that CPD's effectiveness is influenced by several factors, and these include teacher commitment; collaboration; school leadership; schools culture; time and financial resources.

The complexity and challenging work of teachers makes CPD a requisite antecedent, and this is because teachers are able to requisite specialized skills and knowledge -for student learning. One of the objectives of education is to improve the learning outcomes of all students irrespective of their socio-economic background or geographic location is the key objective for education. Therefore, it is important that schools need to enhance the skills and knowledge of the education workforce, teachers in a quest to steering academic achievement [13]. In-depth subject knowledge is necessary for teachers to enable them deliver subject content effectively. They need to fully understand the operational environment and optimize learning. Quality professional learning opportunities to develop were a requirement to teachers for enhancement of the necessary skills and understandings [14]. This is because such skills and

understandings were useful determinants for teachers' job performance in schools.

Chordnork and Yuenyong [15] found that teacher knowledge had a positive influence on student reading comprehension. The scholars concluded that a CPD program that was keen on ensuring that teachers were well equipped with pedagogical content knowledge and appropriate teaching strategies was necessary for enhancing teacher effectiveness and efficiency in schools.

Douglas [16] views training as an endeavor that mold people to develop desirable knowledge, skills, and attitudes needed in solving real life problems. On the other hand, Mburu [17] argues from another perspective, training is the process by which individual's ability to execute a task is enhanced through acquisition of skills, knowledge, and positive attitude necessary for harmonious co- existence in a social set up. On the same note, Muller, [18], since training is perceived as the process of acquisition of knowledge, skills and desirable attitudes needed in addressing threats in real life, an institution that seeks to solve its job performance challenges must consider investing in human capital.

Ruble [19] cited in Nyarigoti [20] discusses nine likely types of outcomes of teachers continuous professional development. These outcomes include the following. *Materials and resources*, that is, teaching provisions, such as worksheets or activities. *Informational outcomes*, referring to fact-based information, for example about new policies or schemes; *New awareness*, explained as a perceptual shift, teachers becoming aware of new ideas and values; *Value congruence*, which in this case involves the extent to which teachers' own values and attitudes fit in with those which the CPD is trying to promote; *Affective outcomes*, that is, how teachers feel emotionally after the CPD, may be negative (for instance, demoralised) or positive (such as confidence); *Motivation and attitude* such as enthusiasm and determination to implement changes; *Knowledge and skills* which includes both curricular and pedagogical, combined with awareness, flexibility and critical thought; *Institutional outcomes* – on groups of teachers, such as consensus, collaboration and support; and *Impact on practice* – The final aim of CPD which focuses on the effect of CPD on learners. These outcomes translate into requisite teachers' job performance towards set school goals.

According to Gathumbi, Mungai, and Hintze [21], the pre-service courses for teachers offered by Universities' Schools of Education and Teacher Training Colleges (TTCs),] have been mocked for its inability to produce graduates whose skills are match with the field expectations . This situation presents challenges that if unmet can cause an upset to the

quality of education offered by teachers in schools. The researcher emphasizes the need of scaling up continuous professional development for the teachers affected. Comparatively, in Nigeria, Olakulehin [22] found that there was a shortage of qualified teachers in public primary schools and this affected their performance as teachers. Teachers' situation in Kenya, calls for continuous professional development to help seal these inadequacies, for their performance is a requirement tied to the success of the education sector. Public primary schools should therefore strive hard to strength TCPD, for instance, by ensuring that teachers are able employ appropriate teaching strategies.

Teacher Training on Pedagogical Content Knowledge

Ma'rufi, Budayasa and Juniati [12] studied teacher's knowledge of students in learning mathematics on limit of function subject. The study focused on the association between PCK and knowledge of students. The study revealed limitations among the teachers, which include their inability to analyze the cause of students' difficulty, mistake, and misconception. The use of re – explanation to students on students' difficulty, mistake, and misconception was well understood by the students.

Maryani and Martaningsih [23] studied the relationship between teacher's PCK (pedagogical content knowledge) and student's motivation in primary schools in Yogyakarta, Indonesia. The study aimed at1) determining the condition of Pedagogical Content Knowledge (PCK) of primary school teachers and 2) establishing the relationship between the teacher's PCK and student's motivation in learning. The study was done using primary school students and teachers. The study found that pedagogical content knowledge had a significant influence on teachers' performance in the schools. With a p value was 0.000, and r was 0.0907, the study findings demonstrated that pedagogical content knowledge had a significant influence on teachers' performance in the schools.

Gess-Newsome [13] studied pedagogical content knowledge with a focus on mathematics and the science subjects. The study established that continuous professional development programs that enhanced teachers' pedagogical content knowledge (PCK) was had a significant influence on students' learning and achievement. Students' learning achievement was considered an important yardstick in measuring teachers' performance. With this mindset, the researcher pointed out that PCK enabled teachers to perform effectively and efficiently.

Chordnork and Yuenyong [15] investigated primary school science teachers understanding and teaching practice as well as the influence on teaching and learning a topic like global warming. The study was carried out among were r primary science teachers,

specifically, science education graduates. The study employed the case study method and collected data using questionnaires. The findings revealed lack of understanding of science teaching practice among teachers, which negatively affected their performance. Graduates had a better understanding than non-graduates had and thus performed better. Science graduates expressed the pedagogical content knowledge in terms of assessment, goal of teaching and linking to the context of socio cultural. In contrast, students' understanding of content global warming, knowledge and belief of curriculum and strategies of teaching were expressed unclearly by non-graduate science teacher.

According to Muller [18], content knowledge embraces the propositional knowledge / 'knowing what' and the procedural knowledge/ 'knowing how' of a discipline. Teachers need to know more than just the 'facts' of their discipline, they need to know the deep underlying principles and structure of the discipline, and they need to know what procedures are used to generate knowledge in the field. Muller argues that 'knowing what' comes down to knowing why something is accepted as knowledge in the relevant field, but this implies knowing how to substantiate the knowledge, knowing how to make such arguments, so that all 'knowing what' also comes down to the particular 'knowing-how.'

According to Kuhn [24], theoretical construct of knowledge generally consists of two elements, namely, content structure and cognitive structure. The first content component is knowledge of teaching objectives, content, and methods. The interdependence of teaching content, objectives, and methods represents the traditional European discourse on didactics. The second content element is knowledge of students' learning process, which comprises awareness of common errors students make and their causes. Both content components are entrenched in a broader context, which, for the vocational sector precisely, is characterized by a high heterogeneity for example: with respect to students' prior knowledge.

Smith [14] explored the relationship between teacher content knowledge and student learning in the context of middle grades force and motion instruction. The study used a sample of 25 teachers. The process involved expert review, domain specification, cognitive interviews with teachers and students, and large-scale piloting and field testing. The study established that teacher content knowledge significantly influenced and student learning in schools.

Maende [25] mentions three measurements of PCK and argues that they are important in teaching mathematics. These include teacher's knowledge of students' prior knowledge (difficulties and

misconceptions), teacher's knowledge of mathematic assignments, and teacher's knowledge of representations, analogies, illustrations, or useful examples of the mathematical content to be taught. The researchers indicated that teachers need to utilize CPD opportunities available in their schools to enhance their capacity along these three constructs.

Langsajo [26] studied the impact of Subject Matter Knowledge of a Teacher in Teaching and Learning Process. The study adopted the survey method. The researcher, specifically, reviewed 22 authors covering United States of America, United Kingdom, and Korea. The study concluded that teachers, who understood subject matter, were able to teach the main points of the subject matter to learners. Langsajo also noted that clarification of misunderstandings of knowledge, were a function of teachers understanding of the subject matter through which, impact is made on learning through enhanced learners' ability to utilize the subject matter taught in class and actively participate in their environment.

According to a survey by NCATE [27], an international organization, divergence and variation international approaches in subject matter preparation and developing effective teachings is reported across the Continents, Regions, and Countries. The survey shows that there is heavy investment in in teacher preparation programs and perform well in Industrialized nations, such as Singapore, Republic of Korea, Belgium, Germany and Japan, and this is reflected in the Trends in International Maths and Science Study (TIMSS) data. Contrary, smaller, and not so affluent nations, such as Ghana, Tunisia, Morocco, Chile, cannot afford much to spend in their teacher preparation program and appear at the bottom of the TIMSS list.

Kar [28] studied the subject matter preparation for (effective) teaching of Mathematics. The study established that teacher's content knowledge was critical for their effectiveness. The researcher noted that the preparation of teachers and / or their knowledge of teaching and learning, subject matter knowledge, experience, and the combined set of qualifications measured by teacher licensure were all precursors for teacher efficacy. Kar opined that a CPD program that focused on subject matter preparation resulted in higher level of teachers' performance in schools.

Varughese and Fehring [29] proposed the Knowledge of Contents and Students (KCS) framework as a guiding step towards conceptualizing, identifying, measuring, and ultimately improving teachers' PCK. The framework also addresses the ability of teachers to design effective instruction and measuring teachers' skills in motivating students to learn mathematics. The researchers stress the need for

teacher's ability to forestall students' difficulties and obstacles, hear and respond appropriately to students' thinking, and choose appropriate examples and representations while teaching. The researchers argued

that teachers must show awareness of students' conceptions and misconceptions about a mathematics topic in both planning and teaching.

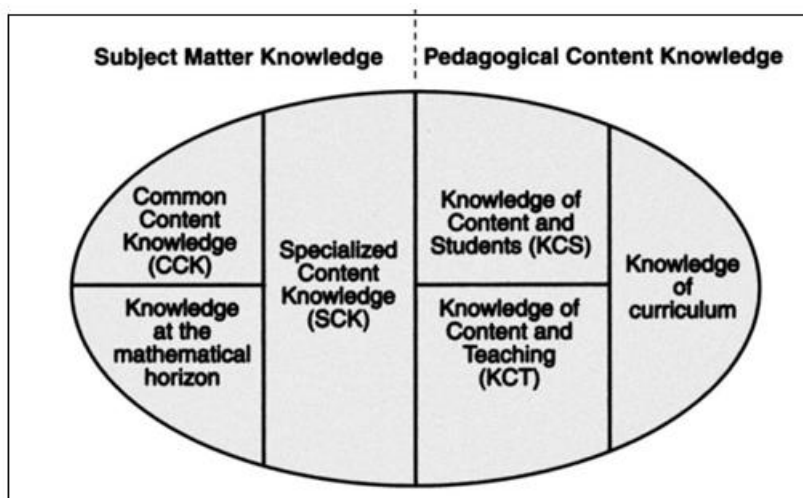


Fig-1: Mathematical knowledge for teaching
Source: Hill, Ball, and Schilling [30]

According to KCS framework, a teacher might have strong content knowledge but weak knowledge of how students learn the content or vice versa. KCS provides knowledge of how to:

- Anticipate what students are likely to think
- Relate mathematical ideas to developmentally appropriate language used by children.

METHODOLOGY

The study was carried in the 22 public primary schools in the sub county among the 22 head teacher and 170 school teachers A sample of 8 head teachers and 51 public primary school teachers was used. The sample for the head teachers was selected using purposive sampling technique while that of the head teachers was selected using simple random sampling technique. Data for the study was collected

by use of questionnaires for teachers and interview schedules for head teachers respectively. Prior to use, the questionnaires were subjected to validity checks and reliability tests. Data collected was analyzed using descriptive statistics (frequencies, means, and percentages) and inferential statistics with the aid of the Statistical Package for Social Sciences computer software version 21. Pearson moment correlation (r) was used to establish the relationship between the variables.

RESULTS/FINDINGS

Adequacy of knowledge on teaching objectives

The teacher respondents were asked to indicate whether they had adequate knowledge on teaching objectives because of the CPD, and the response was as provided in Figure-2.

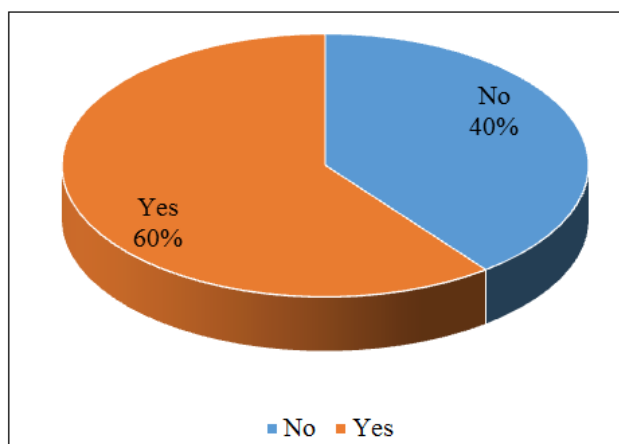


Fig-2: Adequacy of knowledge on teaching objectives
Source: Author (2018)

The study findings in Figure-1 show that 60.4% of the respondents had adequate knowledge on teaching objectives, while 39.6% did not have this knowledge. This implied that most of the teachers had adequate knowledge. This finding was in agreement with a study by Mburu [17] who found that teachers need to be adequately trained on teaching objectives to manage the large classroom sizes due to over enrolment because of free primary education. However, the 40.8% representing those with

inadequate knowledge shows CPD offered to the teachers might not have had the influence expected. A crosstab was computed to determine the effect of CPD attendance and having adequate knowledge on teaching objectives. The crosstab results show that 75.9% of those teachers who had attended. The findings in respect to relationship between continuous professional development program attendance and having adequate knowledge on teaching objectives was as provided in Table-1.

Table-1: Relationship between CPD attendance and having adequate knowledge on teaching objectives

		Do you have adequate knowledge on teaching objectives		Total	
		No	Yes		
Have you ever attended the continuous professional development program	No	Frequency	5	7	12
		%	26.3%	24.1%	25.0%
	Yes	Frequency	14	22	36
		%	73.7%	75.9%	75.0%
Total		Frequency	19	29	48
		%	100.0%	100.0%	100.0%

Source: Author (2018)

Sufficiency of Teaching Content

The findings in respect to whether or not knowledge of teaching content was enough to enhance their performance ratings was as provided in Table-2.

The result in Table-1 show that 73% of the respondents had insufficient content of teaching knowledge to enhance their performance ratings, while

27% had sufficient content of teaching knowledge to enhance their performance ratings. This implied that the knowledge of teaching content obtained through CPD was sufficient in enhancing performance, according to most teachers. The finding was in agreement with a study by Smith [14] who found a significant and positive relationship between teacher content knowledge and student learning.

Table-2: Sufficiency of Teaching Content

Response	Frequency	Percentage
No	35	73
Yes	13	27
Total	48	100

Source: Author (2018)

Knowledge of students' learning process

Teachers were asked to indicate whether or not they had adequate knowledge of student's learning

process to overcome learning difficulties as an outcome of continuous professional development, and the response was as provided in Table-3.

Table-3: Knowledge of Students' Learning Process

Response	Frequency	Percentage
No	9	18.8
Yes	39	81.3
Total	48	100

Source: Author (2018)

The study findings in Table-2 show that 83.1% of the respondents had adequate knowledge of students' learning process required to overcome learning difficulties, while 16.9% had inadequate knowledge of students' learning process required to overcome learning difficulties. This implied that indeed training on teaching content equipped most of

the teachers with adequate knowledge of students' learning process required to overcome learning difficulties. The findings are in agreement with a study by Kuhn [24] who found that knowledge of students' learning process was positively associated with teachers' performance in schools.

Association between Training on Pedagogical Content Knowledge and Teachers’ Performance

The results for Pearson correlations between Training on Pedagogical Content Knowledge and Teachers’ Performance were as presented in Table 4.

The findings in Table-4 show that the Pearson correlation results between Training on Pedagogical Content Knowledge and Teachers’ Performance were as follows. There was a negative Pearson correlation between Training on Pedagogical Content Knowledge and Teachers’ Performance ($r = -0.037$, $p = 0.802$).

Given that, the p value (0.802) was greater than the test significance level ($p > 0.05$, this relationship though negative, was not statistically significant. This means that even though, training on pedagogical content knowledge had a positive effect on teachers’ performance, the association was not significant. This was in agreement with a study by Gess-Newsome [13] who established that continuous professional development programs that enhanced teachers’ pedagogical content knowledge (PCK) was one of the most influential factors contributing to students’ learning and achievement.

Table-4: Association between Training on Pedagogical Content Knowledge and Teachers’ Performance

		Training on Pedagogical Content Knowledge	Teachers’ Performance
Training on Pedagogical Content Knowledge	Pearson Correlation	1	-.037
	Sig. (2-tailed)		.802
	N	48	48
Teachers’ Performance	Pearson Correlation	-.037	1
	Sig. (2-tailed)	.802	
	N	48	48

Source: Author (2018)

CONCLUSION AND RECOMMENDATIONS

The study concludes that training on pedagogical content knowledge had a positive effect on teachers’ performance. Most of the teachers were able to use their teaching strategies and skills continuously and this translated into good performance. The study recommends that there is need for the Ministry of Education to mobilize resources on CPD and put more effort to develop a positive professional development towards teachers. There is need for education providers to provide funds to schools for professional development.

REFERENCES

- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). Effective teacher professional development. *Palo Alto, CA: Learning Policy Institute*.
- Mestry, R., Hendricks, I., & Bisschoff, T. (2009). Perceptions of teachers on the benefits of teacher development programmes in one province of South Africa. *South African journal of education, 29*(4).
- Valazza, G. (2011). Professional development: teacher development and confidence. *One Stop English*.
- Bauml, M. (2011). “We Learned All About That in College”: The Role of Teacher Preparation in Novice Kindergarten/Primary Teachers' Practice. *Journal of Early Childhood Teacher Education, 32*(3), 225-239.
- Arong, F. E., & Ogbadu, M. A. (2010). Major causes of declining quality of education in Nigeria from administrative perspective: a case study of Dekina local government area. *Canadian Social Science, 6*(3), 183-198.
- Mizell, H. (2010). *Why Professional Development Matters*. Learning Forward. 504 South Locust Street, Oxford, OH 45056.
- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). Effective teacher professional development. *Palo Alto, CA: Learning Policy Institute*.
- Kenya, U. (2011). Are our children learning. *Annual Learning Assessment Report: Uwezo Kenya, Nairobi*.
- European Commission (EC). *Continuing Professional Development for Teachers Working in Early Childhood and School Education*. Eurydice, United Kingdom. Retrieved on 28th April, 2018 from https://eacea.ec.europa.eu/national-policies/eurydice/content/continuing-professional-development-teachers-working-early-childhood-and-school-education-90_en
- Hayes, D. (2008). Becoming a teacher of English in Thailand. *Language Teaching Research, 12*(4), 471-494.
- Boyle, B., Lamprianou, I., & Boyle, T. (2005). A longitudinal study of teacher change: What makes professional development effective? Report of the second year of the study. *School effectiveness and school improvement, 16*(1), 1-27.
- Budayasa, I. K., & Juniati, D. (2018, January). Pedagogical Content Knowledge: Teacher’s Knowledge of Students in Learning Mathematics on Limit of Function Subject. In *Journal of Physics: Conference Series* (Vol. 954, No. 1, p. 012002). IOP Publishing.

13. Hattie, J., & Anderman, E. M. (Eds.). (2013). *International guide to student achievement*. Routledge.
14. Smith, S. P. (2009). Exploring the relationship between teacher content knowledge and student learning. In *Proceedings of the NARST Annual Meeting*. <http://www.horizon-research.com/atlast/uploads/Papers%20and%20Presentations/P-1444-687%20PS%20Smith%20paper.pdf>.
15. Chordnork, B., & Yuenyong, C. (2018, January). Understanding primary school science teachers' pedagogical content knowledge: The case of teaching global warming. In *AIP Conference Proceedings* (Vol. 1923, No. 1, p. 030014). AIP Publishing.
16. Douglas, C. J. (2009). *A comparison of what teachers know versus what teachers practice* (Doctoral dissertation, Northcentral University).
17. Mburu, J. N. P. (2013). *Influence Of Teachers' Job Satisfaction On Pupils Performance In Kenya Certificate Of Primary Education Examination In Gilgil District Nakuru County, Kenya* (Doctoral dissertation, University of Nairobi.).
18. Muller, J. (2012). The body of knowledge/le corps du savoir. Paper presented at the Seventh Basil Bernstein Symposium, Aix-en-Provence, France.
19. Ruble, L. A., Usher, E. L., & McGrew, J. H. (2011). Preliminary investigation of the sources of self-efficacy among teachers of students with autism. *Focus on autism and other developmental disabilities*, 26(2), 67-74.
20. Nyarigoti, N. M. (2013). Continuing professional development needs for English language teachers in Kenya.
21. Gathumbi, A. W., Mungai, N. J., & Hintze, D. L. (2013). Towards comprehensive professional development of teachers: The case of Kenya. *International Journal of Process Education*, 5(1), 3-14.
22. Olakulehin, F. K. (2007). Information and communication technologies in teacher training and professional development in Nigeria. *Turkish Online Journal of Distance Education*, 8(1).
23. Maryani, I., & Martaningsih, S. T. (2015). Correlation between Teacher's PCK (Pedagogical Content Knowledge) and Student's Motivation in Primary School. *International Journal of Evaluation and Research in Education*, 4(1), 38-44.
24. Kuhn, C., Alonzo, A. C., & Zlatkin-Troitschanskaia, O. (2016). Evaluating the pedagogical content knowledge of pre-and in-service teachers of business and economics to ensure quality of classroom practice in vocational education and training. *Empirical Research in Vocational Education and Training*, 8(1), 5.
25. Maende, B. J. (2012). *Influence of Professional Development on Teacher Effectiveness in Public Secondary Schools in Mumias District, Kenya*. An unpublished M.ED Thesis: Maseno University.
26. Jadama, L. M. (2014). Impact of subject matter knowledge of a teacher in teaching and learning process. *Middle Eastern & African Journal of Educational Research*, 7(1).
27. National Council for Accreditation of Teacher Education (NCATE). (2013). *What Makes a Teacher Effective?* Washington D. C. NCATE.
28. Kar, A. (2017). The subject matter preparation for (effective) teaching of mathematics.
29. Varughese, V. K., & Fehring, H. (2009). Effects of Students' Approaches to Learning on Performance in Two Pedagogical Environments. *International Education Studies*, 2(4), 10-14.
30. Hill, H. C., Ball, D. L., & Schilling, S. G. (2008). Unpacking pedagogical content knowledge: Conceptualizing and measuring teachers' topic-specific knowledge of students. *Journal for research in mathematics education*, 372-400.