Multiple Tasks Performed by a Teacher Implementing Linear Programming to Enhance Student Performance at Particular Secondary schools in the Western Part of Zambia's Nkeyema District: A Hermeneutic Approach

Chrispine Mulenga Mwambazi
Mathematics, Munkuye secondary school

Abstract- The study examines the various roles that teachers have in enhancing students' performance in linear programming at a few chosen secondary schools in Zambia's Nkeyema district. Sixteen participants from particular secondary schools participated in the study. The Nkeyema District sample members were subjected to the deliberate sampling technique. The information obtained from focus groups and interviews was subjected to a thematic analysis. This study identified the roles that teachers played in improving student performance in selected secondary schools through the teaching of linear programming. Furthermore, teachers instructing in linear programming employed suitable teaching methods. Therefore, among other things, it is advised that teachers increase their knowledge and skill set so as to properly teach linear programming.

Keywords: Teachers; Roles; performance; Schools; Nkeyema; Zambia.

INTRODUCTION

Like everywhere else, Zambia depends heavily on teachers for learning. Their impact on the competence of the teaching workforce has been the main cause of this. Teachers have taught learners how to tackle examination questions and contributed to the established mechanisms of collaboration (Mejía-Arauz et al. 2018). However, there is still poor performance in linear programming.

On the other hand, because of their subpar work, officials have condemned teachers as obstacles to changes that might improve quality (ECZ, 2019). Conversely, teachers contend that they have contributed significantly to students' success in linear programming. The assumption that teachers have a single job is rather dubious from an intellectual standpoint.

This study eschews causal reasoning in favour of demonstrating the existence of cases in which instructors have improved educational quality through their roles they play as professionals. This is critical for professions that operationalize reflection as a required skill (Marshall, 2019; Rusticus & Justus, 2019).

Gallagher et al. (2017, p. 11) state that, in theory, improving the learning environment can be achieved by having teachers focus on the lessons they want their students to learn, aligning their instruction to the lessons, and developing assessments that show how well students are learning the material. According to Stoszkowski & Collins (2017), cooperative working connections exist between governments and educators in a number of global countries. Instead of focusing on providing immediate answers, this two-way method seeks to comprehend the rationale behind practical actions while giving the facilitator the freedom to make well-informed decisions and conceptualize their point of view for the learner (Hall, 2020). In this case, the facilitator activities may play a crucial role in supporting the reflective learning process for both inexperienced students and seasoned professionals by encouraging conversations. It has been demonstrated that concentrated cooperative discussions help pre-service teachers grow professionally (Jao et al., 2020) and help teachers make meaning of their experiences and practice (Jarvis & Clark, 2020).

This means that supervisors must set an example of professional, reflective behaviors (Dahl & Eriksen, 2016). Dahl & Eriksen (2016) state that it is critical for

facilitators to set an example of professional, reflective behaviors when leading discussion, saying that "teachers also need to mirror themselves and be ready to stand in front of the mirror with students and fellow teachers."

Accordingly, a facilitator is a role model who participates in the process and assists others in exploring their experience from multiple angles, challenging their identity and agency within the framework of practice (Koh et al., 2017).

In an independent, encouraging setting, facilitators can help students become active inquirers. According to Bolton, a reflective facilitator helps students take charge of their own learning; through-the-mirror facilitators remain uncertain while their participants engage in active, dynamic engagement. (Bolton, 2010)

Teachers want to be uniquely equipped to guarantee, in line with what is determined to be essential to developing learners, growth, and enhancing performance through the expression and promotion of a positive professional identity, as well as excellent instruction. It has been shown that teachers are capable of fostering these elements inside their teaching profession.

Consequently, facilitators ought to support a student-led approach from the outset, starting with the learner's thoughts: "I thought this was great that everyone had a voice and that their opinions were really valued, but the facilitator led the session initially" (Gallagher et al., 2017, p. 10). This milieu led the researcher to explore the manifold roles played by teachers in instructing linear programming to improve performance at some selected Secondary School in Nkeyema District.

STATEMENT OF THE PROBLEM

Although teachers use different roles to guarantee that students' performance is enhanced when teaching linear programming, there is conjecture that the role teachers play in this process contributes very little to learning, which can lead to high student performance in the classroom. Given that this study shows that so little is known about teachers' contributions to the teaching of linear programming in schools, it is critical to comprehend how teachers affect learning through the roles they play. As a result, it is essential to recognize the role teachers play in improving students' educational performance in the educational setting.

SPECIFIC OBJECTIVE

Exploring the various roles that a teacher play in teaching linear programming to raise learner performance.

THEORETICAL FRAMEWORK

The Constructivist learning theory served as the theoretical foundation for this investigation.

Constructivist learning theory is the most appropriate theoretical framework for examining how teachers might enhance learners' performance in linear programming, especially by utilizing scaffolding techniques and Social Constructivism. This framework aligns well with the interactive and problem-solving nature of linear programming.

According to constructivist learning theory, knowledge is created by students from their interactions and experiences with the outside world. It suggests that learners can achieve higher levels of understanding with the guidance of a knowledgeable other, such as a teacher. Teachers can provide the necessary support to bridge the gap between what learners can do independently and what they can achieve with assistance (Daniels, 2001).

According to Vygotsky, (1978), Collaborative learning encourages group work and peer interaction helps students learn from each other. Teachers play a crucial role in facilitating these interactions and ensuring productive collaboration.

Bruner, (1966) reveals that Instructional Scaffolding is the best way of improving learner performance: This involves providing temporary support to learners to help them achieve tasks they cannot complete independently. Linear programming, teachers can use scaffolding techniques such as breaking down complex problems, providing hints, and guiding problem-solving strategies. Teachers initially provide a high level of support and gradually withdraw it as learners become more proficient, enabling them to become independent problem-solvers.

Providing Instruction in Linear Programming

According to Hillier & Lieberman (2010), the teacher should start by explaining the idea and summarizing

its importance in the fields of business, engineering, economics, and military applications. The teachers should also explain the idea of the objective function, and whether it should be minimized or maximized. They should talk about the linear inequalities that serve as restrictions to the feasible region. Describe the two-dimensional graphical method for locating the feasible region. Teachers should use a graphical strategy when teaching problems with two variables to help students visualize the subject (Bazaraa, Jarvis, & Sherali, 2010). Describe the algorithmic technique of the simplex method for tackling higher-dimensional linear programming problems.

They should give instances of how linear programming is used in the real world to optimize manufacturing scheduling, resource allocation, transportation, and food issues. Show how to apply linear programming step-by-step to solve complicated issues using in-depth case studies (Chvátal, 1983).

To improve understanding, involve students in interactive lessons, group projects, and practical exercises. Students should be encouraged to present their answers to real-world situations (Winston, 2003). Make use of graphs and other visual aids to assist pupils in understanding abstract ideas. A variety of tasks, from simple to complex, should be assigned to students. Exams and quizzes should be used to gauge how well students grasp and apply subjects. Assign tasks that call for using linear programming to solve problems in practical situations.

By combining these resources and methods, educators can effectively teach linear programming and equip students with the skills to apply Linear Programming techniques in various domains. Cobb, (1994) assert that interactive problem solving facilitate problem-solving sessions where students actively engage with linear programming problems, discussing and iterating solutions. Teachers can greatly improve their students' comprehension and performance in linear programming by incorporating constructivist principles into their lesson plans. This method not only helps students grasp concepts more deeply, but it also helps them become proficient in linear programming.

METHODOLOGY

Research Design

Qualitative study design was ideal for this study as it allowed an insight investigation and focuses on the specific case and understands qualitative study aspect. A study offered the researcher a more in-depth understanding in enhancing performance based on the experiences from the participants.

Study Population

According to Smith, Doe, & Brown (2020), a population is a collection of people, things, or products from which samples are taken in order to measure anything. All secondary school math teachers and department heads in the Nkeyema District made up the study's population.

Sample Size

According to Creswell & Poth (2018), in order to draw accurate and trustworthy results, a research sample needs to be completely representative of the features of the population. There were 15 participants in the current study, including 12 math teachers and 3 heads of departments. Creswell & Poth (2018) suggest that sample sizes in qualitative research are typically smaller than those in quantitative research because the goal is not generalization but an in-depth understanding of the phenomenon.

Sampling Procedure

Purposeful sampling was used to choose participants who had certain traits or experiences that are pertinent to the study issue in order to gain in-depth insight as opposed to extrapolating from a sample to the public (Patton, 2015). The goal is to obtain in-depth, comprehensive information from the most qualified sources. Purposive sampling was employed by the investigator using homogenous by concentrating on a specific subset with comparable features, the sampling strategy was able to leverage the expertise and experience of educators to deliberately pick the important participants from each of the three Secondary School teachers that made up the interview sample.

Data Generation Instruments

To achieve triangulation in data collection methods and instruments, the researcher combined interviews and focus group discussion in data collection process.

Interviews

One of the techniques the researcher used to collect data for the study was semi-structured interviews. According to Creswell & Poth (2017), semi-structured interviews permit the investigator to inquire more pertinent questions to get the participants talking while

letting them openly discuss their experiences. Since qualitative inquiry typically yields in-depth data, the teachers' responses were gathered through one-on-one interviews (Rubin, & Rubin, 2011). This description helped the researcher understand participant experiences on instructors' contributions to improving the learning environment in schools. A thorough grasp of teachers' viewpoints, experiences, and attitudes about their involvement in creating a calm learning environment in the classroom was intended to be obtained through semi-structured interviews (Patton, 2014).

Focus Group Discussion

Teachers in a few chosen Nkeyema schools participated in focus group interviews with the researcher. FGDs can spark conversation and reveal common attitudes, experiences, and opinions in a group context. Social norms and group behaviors are the result of more open exchange of opinions (Krueger & Casey, 2014). The focus group discussion was held in order to follow up with math teachers and get further information, particularly regarding their contributions to the enhancement of student performance.

Data Generation Procedure

Before conducting the interviews, permission was from the District Education Board Secretary and head teachers of the sampled schools. The researcher made prior arrangements with the participants on time and dates for conducted interviews and focus group discussions respectively. The head of departments and teachers of mathematics were subjected to interviews at separate convenient times and dates.

DATA ANALYSIS

Transcribing each interview served as the data processing process. The researcher transcribed the interviews listened to all the recorded interviews, following them against each transcript. The purpose was to ensure that the transcriptions were properly done, and to make any corrections and additions. The researcher read the transcripts multiple times in addition to listening to the recordings multiple times. The researcher took this action for two reasons: first, to ensure that the thoughts were presented in a logical manner by making all the essential edits and revisions. Secondly, to start interpreting the interviews collectively and to pinpoint new concepts that will be expanded into the study's topics.

The researcher entered the transcripts and used a theme analysis to code the data after making any required modifications. A valid and replicable set of findings can be reached from qualitative data on pertinent topics in their respective contexts when using thematic analysis as a research approach. The data were coded, then sorted and organized into themes.

Data Quality Assurance

According to Creswell & Poth (2017), qualitative research on data quality assurance offers profound insights into the organizational, process, and human aspects of upholding strict data standards. Through the examination of stakeholder perspectives, organizational practices, cultural influences, and practical implications, these studies enhance our understanding of the attainment and maintenance of data quality in many contexts. Moral aspects ensuring participant informed permission, the study's ethical behavior, and the confidentiality of sensitive data. Employing several data sources and techniques to check results and ensure robustness.

Ethical Considerations

While conducting the study, the researcher was aware of the position on ethical matters. The investigator additionally disclosed and elucidated the study's objectives before to the start of every interview and in the invitation letters distributed to the subjects. Permission to contact the sampling schools was granted by the District Education Board Secretary (DEBS) of the Nkeyema district.

FINDINGS AND DISCUSSION

Teaching in Schools

Curriculum design, instructional strategies, technological integration, and teacher professional development are essential components of teaching linear programming in schools. Learners' comprehension of the significance of mathematical concepts are enhanced when real-world problems and applications are incorporated into linear programming lessons, claim Akyüz & Yavuz (2016).

Academic programs ought to conform to both domestic and global benchmarks. When teaching learners linear programming, teachers should make use of active learning approaches. Effective teaching

of linear programming requires the application of active learning strategies. These methods encourage learners to focus on real-world problems and develop their critical thinking skills (Prince, 2004).

With the intention of envisioning and resolving linear programming problems, software tools such as GeoGebra, MATLAB, and other linear programming solvers (such as LINDO, CPLEX) are useful. These resources aid learners in understanding difficult ideas and doing out computations quickly (Winston, 2016).
In order to stay current with the newest teaching techniques and technical resources in linear programming, teachers must engage in on-going professional development. Effective CPD techniques include peer cooperation, online courses, and workshops (Desimone, 2009).
Training programs should emphasize both pedagogical and content knowledge to make sure teachers are competent in both teaching and understanding linear programming.
By creating professional learning communities (PLCs), teachers can exchange instructional ideas, materials, and first-hand knowledge about teaching linear programming. According to DuFour & Fullan (2013), this cooperative method can raise teacher efficacy and improve student results.
Due to a lack of technology resources, a number of schools could find it challenging to integrate interactive teaching methods and software. Diverse learning requirements can be addressed with the aid of scaffolding and differentiated instruction. It is crucial to offer extra assistance and tools to pupils who have trouble understanding the basic ideas. Understanding fundamental principles is necessary to address challenges related to teaching linear programming in the classroom today and to highlight useful strategies for improving teacher preparation and student learning.

Teacher Divergent Roles

Teacher Divergent Roles and enhancing academic performance is largely dependent on teachers taking on diverse roles in the classroom, especially difficult subjects like linear programming. Diverse roles encompass the array of duties that an educator can undertake beyond the confines of the classroom, such as facilitator, mentor, coach, and evaluator. This comprehensive method can greatly enhance students' comprehension and proficiency in linear programming.

Re-teaching the topic

One of the most important parts of a teacher's job in education is re-teaching. Re-teaching is going over material and skills that pupils haven't learned with them to make sure they get it before going on. This approach is essential for a number of reasons, including filling in learning gaps—students frequently possess differing degrees of conceptual knowledge and mastery—(Hattie, 2008). By giving those who require it more guidance and support, Re-teaching aids in closing these gaps. Re-teaching can improve overall student accomplishment by guaranteeing that all students reach a particular level of proficiency prior to moving forward (Tomlinson, 2001). This also improves student achievement.

Students benefit from this process by developing a strong foundation of knowledge and abilities, which is crucial for their success in the classroom. Teachers can diversify their lesson and meet the various learning demands of their pupils by re-teaching. This could entail utilizing various teaching techniques, resources, or pace to assist every student in meeting the intended learning objectives. It increases students' motivation and self-assurance. Students can become more confident and motivated when they are given more guidance to assist them grasp a topic once they are having difficulty with it. A growth mind-set and confidence in one's capacity to learn and succeed can be fostered by this pleasant experience (Marzano, 2007).
Through re-teaching a subject—like linear programming, can greatly enhance academic achievement. Re-teaching helps students strengthen their comprehension by revisiting basic concepts and skills. There is a greater chance of long-term retention when students are exposed to the same content again. For instance, cognitive psychology research stresses that frequent exposure to knowledge helps transfer it to long-term memory, making it more accessible for future use (Brown, Roediger, & McDaniel, 2014).

Research indicates that addressing misconceptions through re-teaching can lead to better conceptual understanding and application of mathematical concepts (Chi, 2005). Re-teaching enables teachers to

adapt their lesson plans and practices to accommodate a range of student learning preferences. This might include hands-on activities, visual aids, and interactive problem-solving sessions. Individual learning preferences and requirements are addressed through differentiated instruction, which has been demonstrated to increase student performance (Tomlinson, 2001).

Re-teaching frequently entails more practice chances. Learning how to apply knowledge and get instant feedback is essential to difficult subjects like linear programming. Frequent practice and timely feedback are necessary for the acquisition of new skills in learning (Ericsson, Krampe, & Tesch-Römer, 1993).
Re-teaching sessions might include collaborative learning, where students tackle problems together. This enhances understanding and develops analytical and problem-solving skills.

Opportunities for formative evaluations are presented by re teaching, which enables teachers to test students' comprehension and modify their lesson accordingly. To quickly close learning gaps, this continuous evaluation is essential. Formative assessments identify areas in which students require more support and help to shape future teaching strategies (Black & Wiliam, 1998). These references and strategies underscore the effectiveness of re-teaching in enhancing student comprehension and performance in complex subjects like linear programming.

Facilitator Role
According to Prince (2004), teachers ought to adopt a facilitator role. Instead of giving out straight answers, teachers who play the role of facilitators assist pupils in solving problems. This position promotes learning, which is necessary for understanding linear programming ideas. Facilitators lead students through difficult tasks to enhance their understanding and ability to apply concepts (Bonwell & Eison, 1991).

Mentor Role
Teachers who mentors help students set goals for their education and provide them feedback based on their own needs. Learners' confidence and motivation can be increased by mentoring, which is essential for taking on difficult subjects like linear programming (Anderson & Creswell, 2010). Evaluate Student Learning in Linear Programming Using a Mentorship Approach.

Coach Role
Teachers work as coaches, concentrating on helping pupils improve their skills by repetition and support. This means providing exercises and real-world issues that mimic the use of linear programming in order to enable students practice a lot and become proficient (Cavanagh, 2006). Teachers of mathematics and applying mathematics: Reactions to changes in the curriculum.

Evaluator Role
As critical assessors, teachers assist students in identifying their areas of strength and weakness. Frequent evaluations and comments can help students see their strengths and areas for development, promoting a growth mind-set and on-going advancement in their linear programming studies. With this method, students will have the help they need to comprehend and apply principles of linear programming, regardless of their unique learning styles and needs (Hiebert & Grouws, 2007).
Providing diverging roles are sufficient to significantly improve students' academic progress. A strong educational framework is produced by promoting active learning, providing coaching for skill improvement, mentoring for individualized guidance, and evaluating for on-going feedback. This approach enhances students' application and comprehension while also building the skills required for advancement in the classroom (Borich, 2016).

According to Marzano (2007) study, conflicting and competing demands put teachers in Zambia in a difficult situation.

According to one perspective, the teacher's duties included making sure the students understood the material and passed the test. However, these positions were contingent upon the circumstances surrounding the teachers.

A head of department from secondary school "C" attests to the role that teachers play in making sure learners pass tests and that teachers are providing quality instruction.
HOD 1 remembers:

> *"In terms of the role of teacher teaching effectively, is very critical, because teaching should be delivered effectively to enable learners pass the exams. When we scheme the work for the term i monitor the teaching and ensure that it is done as schemed" (HOD 1, 12.04.2024).*

This assertion is consistent with Hattie's (2008) assertion that students benefit from clear, structured teaching methods in order to comprehend the basic ideas behind linear programming. Learners understand the mathematical models and techniques involved in the subject matter when teachers present the material logically and step-by-step. Effective teaching is a key factor in improving student performance in subjects like linear programming because it enables students to apply problem-solving strategies, understand complex concepts, and develop self-confidence. Rather than just imparting knowledge, a facilitator's job in the classroom is to support and guide students as they learn. As facilitators, teachers establish a climate in the classroom that promotes critical thinking, active engagement, and the growth of problem-solving abilities.

HOD 2 commented that:

> *"I usually advise students to put in a lot of effort and study. I make sure that every instructional resource is easily accessible" (HOD 2, 12.04.2024).*

This finding is consistent with the findings of Weimer (2002), who stated that in a student-centered classroom, the teacher's job is to assist learning by fostering an atmosphere that values student participation and independence. By fostering an environment where students actively participate in their own education, teachers support learning. This entails turning the emphasis from the instructor—who serves as the main information source—to the experiences and questions of the students. Prince (2004) asserts that teachers should take on the role of facilitator. Teachers who take on the role of facilitators help students solve difficulties rather than providing them with predetermined answers. This job encourages learning, which is important to comprehend concepts related to linear programming. In order to improve students' comprehension and application skills, facilitators guide them through challenging assignments (Bonwell & Eison, 1991).

In order to promote active involvement, Prince (2004) noted that activities like as talks, problem-solving exercises, and group projects should be included. Teachers bear the task of guaranteeing that students comprehend the material, can write and pass exams, and are given a supportive learning environment—all of which are essential for enabling independent and productive study.

Conversely, a dearth of helpful study resources demotivates educators and students, which lowers the standard of instruction given. According to Tchamyou et al. (2019) and Kumar et al. (2017) the performance is severely impacted by inadequate fundamental infrastructures in Africa and Asia in a number of ways. Because of inaccurate or out-of-date data, this results in less-than-ideal linear programming models. Many Asian countries, especially rural ones, lack advanced computer equipment and high-speed internet, which makes it difficult to apply techniques like linear programming (Kumar et al. 2017).

Proficiency in elements of operations research is necessary for the implementation and optimization of Linear Programming models. In underdeveloped nations, limited access to specialized training and inadequate educational infrastructure are the main reasons for the dearth of highly skilled workers with efficient linear programming skills. Deci and Ryan (1985) note that among the challenges teachers confront on a daily basis are packed classrooms and a dearth of pedagogical support. Enhancing students' academic performance is largely dependent on teachers' involvement in processes, particularly in challenging courses like linear programming.

Active Learning Strategies:

By incorporating these techniques, educators can establish a more productive classroom that encourages

student achievement and facilitates exam pass rates. Active learning strategies including group projects, problem-solving sessions, and interactive discussions can greatly improve students' comprehension and retention of linear programming ideas. According to Prince (2004), students' performance is improved by active learning approaches because they encourage critical thinking and involvement, both of which are essential for acquiring linear programming.

Regular formative assessments and constructive feedback help students identify their weaknesses and misunderstandings in real-time, allowing for timely intervention and support.

Black & Wiliam (1998) highlight that formative assessments are linked to substantial gains in student performance, as they guide learning and provide a feedback loop to students .

Desimone (2009) highlights the direct relationship between enhanced teaching techniques and better student learning outcomes.

Teachers can dramatically increase students' comprehension and problem-solving abilities in linear programming by scaffolding their training by breaking difficult tasks down into manageable pieces and providing personalized support based on the needs of each individual student.

The theory proposed by Vygotsky in 1978 lends credence to the notion that pupils learn best when instructional support is adapted to their current comprehension level. Teachers help students develop goals for their study and give them feedback according to their individual needs.

Mentoring can boost learners' self-esteem and motivation, which is crucial for tackling challenging courses like linear programming (Anderson & Creswell, 2010). Using a mentoring approach, assess students' learning in linear programming.

HOD 3 (head of department) from secondary school 'B' commented that:

> *"Teacher plays a big role in ensuring that learners Perform better in the exams. They advise learners to be committed to learning" (HOD 3, 14.04.2024).*

Teachers are essential in helping students by serving as mentors and offering support outside of the classroom. Numerous factors, both personal and professional, might influence students' development through their mentoring. Teachers help students develop their problem-solving skills, which are essential for success in further education and other fields (Brookfield, 2012). Teachers who are excited and passionate about their subject can elicit comparable emotions in their students. Since students actively engage in class and raise questions when needed, they are able to understand the fundamentals of linear programming.

As coaches, teachers focus on providing students with the repetition and support they need to advance their skills. This entails giving students exercises and real-world problems that imitate the application of linear programming so they can practice a lot and becoming proficient (Cavanagh, 2006). Math teachers should respond to curriculum changes in applying and teaching mathematics.

Teacher 4 from secondary school 'A' commented that:

> *"Teachers train learners on how to study and answer examination questions without leaving any learners behind. This in itself contributes to good learner academic performance as many learners are encouraged to acquire knowledge. This is so because learners learn at different pace" (T4, 13.04.2024).*

This finding is consistent with Fisher & Frey's (2008) observation that teachers assist students in acquiring critical thinking, problem-solving, and time management abilities through coaching. Effective coaching requires understanding each student's unique needs and providing customized support to help them overcome specific challenges (Tomlinson, 2001).

In order to aid in the academic and personal growth of their pupils, teachers frequently take on coaching roles. This entails mentoring pupils, offering constructive criticism, and creating a welcoming classroom atmosphere.

Sweller (1988) argued that comprehending various ideas including constraints, objective functions, viable regions, and optimization strategies is necessary for successful linear programming. Rushing can result in

cognitive overload, which makes it difficult for students to properly absorb and integrate knowledge. According to Sweller (1988) cognitive load theory, learning and retention might be hampered by a large amount of information being presented quickly.

As critical assessors, teachers assist students in identifying their areas of strength and weakness. Regular checks and feedback can assist students in identifying their areas of strength and improvement, fostering a growth mind-set and continuous progress in their linear programming studies (Black, & Wiliam, 1998).

With this method, students will have the help they need to comprehend and apply principles of linear programming, regardless of their unique learning styles and needs (Hiebert & Grouws, 2007). Teachers play a variety of roles as evaluators and have a big influence on the educational process.

In this capacity, their duties include developing the curriculum, giving feedback, and evaluating the learning of the students.

Teacher 6 from secondary school 'C' added to say

> *"I give fortnight test and evaluate the outcomes. This helps to improve academic performance in schools" (T6, 13.04.2024).*

This claim is consistent with Shepard's (2000) thesis that educators diagnose students' unique learning requirements using assessment data and modify their pedagogical approaches accordingly. This may entail determining if a learner has learning problems, needs additional assistance in some areas, or has advanced skills that might benefit from more difficult content. The accountability frameworks in education also include teacher evaluations. They guarantee that pupils are meeting learning objectives and that standards are being met (Darling-Hammond, 2010).

Student success in linear programming, a mathematical optimization technique, can be greatly impacted by teacher monitoring. In order for students to learn hard topics like linear programming, active teacher monitoring is necessary to ensure that they stay on task (Archer & Hughes, 2011). A stronger correlation exists between enhanced instructor supervision and elevated student engagement and focused behavior, which can influence learning outcomes in challenging courses such as linear programming.

Monitoring significantly affects the performance of linear programming (LP). The study by Bixby, (2012) revealed that Monitoring allows for the identification of bottlenecks in the optimization process, whether they are computational inefficiencies or formulation issues. Gondzio (2012) emphasized that monitoring offers effective problem-solving strategies as well as insights into the teacher's behavior.

Suffice to say monitoring enhances Linear Programming performance by identifying and addressing inefficiencies, dynamically allocating resources, tuning algorithms, detecting and correcting errors, benchmarking, and facilitating adaptive strategies.

Another teacher 5 interviewed from school 'B' commented that:

> *"It's my job to get pupils organized and help them so they can perform better. Additionally, to educate, encourage, and motivate students to achieve better" (T5, 13.04.2024).*

Planning has a big influence on linear programming (LP) models' effectiveness, precision, and applicability. Appropriate preparation is necessary to guarantee that the linear programming model accurately represents the real-world situation. This entails accurately specifying the variables, restrictions, and goal function. Bradley, Hax, & Magnanti (1977) emphasize that the initial problem formulation stage is crucial, as errors here can propagate through the entire solution process, leading to significant performance issues in both the quality of solutions and computational efficiency. It is suffice to say planning affects Linear Programming performance by ensuring proper problem formulation, accurate data handling, appropriate algorithm selection, effective complexity management, robust sensitivity analysis, and continuous monitoring. By addressing these factors through careful planning, organizations can optimize the efficiency and effectiveness of their linear programming models.

Teachers 5 from secondary school 'A' said that:

> *"I have been teaching for some years now. I attend to learners regularly; apply appropriate teaching methods to meet the matters concerning improved schools' performance" (T5, 9.04.2024).*

Cangelosi (2003) asserts that learners' performance in linear programming is impacted by teachers' use of ineffective teaching strategies. Teachers who fail to make a subject understandable or who don't engage pupils are held accountable. Since linear programming is a complicated subject, interactive teaching strategies and clear, real-world examples are needed. Some students may struggle more than others if teachers do not modify their instruction to accommodate the different skills and learning styles of their students.

Teacher 7 said it was due to lack of motivation.

> *"The learners of nowadays are not serious with education. They are different from the yester years in terms of commitment. We try our best as teachers but learners should have an input as it was very crucial, on a part of the learners" (T7, 14.04.2024).*

The aforementioned results confirm those of Pinder (2014), who found that learners who are dedicated comprehend the core ideas of linear programming, including feasible regions, objective functions, and constraints. Improved problem-solving abilities are facilitated by this profound comprehension. Linear programming, among other courses, are greatly impacted by the motivation of teachers. Teachers should engage learners effectively in learning to influence positive results. Improving learners' motivation can significantly enhance academic performance in subjects like linear programming. Motivation can be intrinsic (driven by interest or enjoyment in the task itself) or extrinsic (driven by external rewards or avoiding negative outcomes).

According to a study by Harackiewicz et al. (2016), making course content relevant to students' lives can increase their interest and motivation to learn, which in turn enhances academic performance. Using interactive simulations, practical experiences, and group problem-solving as active learning strategies can boost student engagement. Students who actively participate gain a deeper understanding of difficult concepts.

The study by Bloom (1984) on mastery learning shows significant improvements in student performance when mastery-based approaches are used. Providing timely and constructive feedback helps students understand their mistakes and learn from them. Support from instructors and peers can also maintain motivation.

Allowing students some degree of activities can enhance their intrinsic motivation. For instance, letting students choose project topics that interest them can make the learning process more enjoyable. Gamification boosts educational settings (Deterding et al., 2011). She contends that governments and provinces in the US and Canada have the executive power to specify the boundaries and scope of a teacher's subject-matter expertise.

Learner performance

The study also established that teachers felt that learners were not paying attention during class discussions hence missing out. They did not get teachers 'explanation required.

Teacher 10 commented that:

> *"When learners miss teacher's explanation they can't fix it. They have missed important concepts so they cannot recall in an examination" (T10, 14.04.2024)*

The discovery aligns with the findings of Chi & Wylie (2014), who demonstrated that teacher explanations aid in the clarification of complicated concepts and give understanding-supporting context. Students might struggle to comprehend complicated concepts without these explanations, which could lead to misconceptions and a cursory understanding. Insufficient explanations might lead to a higher cognitive load for students trying to learn. Their

working memory may get overloaded while processing information on their own, particularly when dealing with complicated issues. It is true that, generally speaking, students may suffer from a variety of negative outcomes when there are insufficient explanations from their teachers, including reduced understanding, increased cognitive load, and limited problem-solving skills. For the best possible student outcomes, effective teaching strategies that incorporate concise, interactive explanations are needed.

Teacher 11 from secondary school 'A' commented that:

> *"There is no need of the learner proceeding to the next grade when they have not understood the concept from the grade they are coming from. Learners should have sound and strong learning background to enable progression" (T11, 16-04.2024).*

The aforementioned assertion is consistent with Hillier & Lieberman's (2015) praise of the fact that precondition knowledge affects performance. Strong grasps of mathematical ideas, experience with linear algebra, optimization strategies, and problem-solving abilities are usually included in this expertise. It is sufficient to remark that performance is greatly impacted by prerequisite knowledge in mathematics, optimization strategies, and problem-solving methodologies. Having a solid foundation in these areas improves comprehension, productivity, and precision while creating and resolving linear programming issues.

In another vein, teacher 12 from secondary school 'A' states that:

> *"A learner who is positive always tends to do better in academics. These learners are motivated to strive to better performance. However, learners should have a strong learning foundation realise good results, which is a core factor as to why teachers teach new concepts" (T12, 13.04. 2024)*

According to Duckworth et al. (2007), adopting a positive mind-set can boost motivation and perseverance, solving challenging linear programming issues that may call for a lot of iteration and refinement. In multiple ways, performance in linear programming and associated optimization tasks can be greatly enhanced by adopting an optimistic mind-set. Thus, placing a strong emphasis on having a positive mind-set is one tactical approach to optimize performance.

Teacher 14 from secondary school 'B' echoed that:

> *"The learners should be positive, remove math phobia and concentrate and study hard. They should also learn to consult peers at their level. I for one believe that asking where you are clear can help to improve the academic performance depending on the-quality candidates from low-quality candidates" (T14,14.04.2024).*

According to Fredrickson (2001), having a positive mind-set has been demonstrated to improve cognitive abilities like memory, focus, and problem-solving techniques. Positive emotions, according to Fredrickson's broaden-and-build theory, increase awareness and stimulate creative, diverse, and exploratory ideas and behaviors. According to Dweck (2006) theory of growth mind-set, students who believe their abilities can be developed through hard work and dedication (growth mind-set) show greater motivation and achieve higher academic outcomes. Boaler, (2013) revealed that students with a positive attitude towards problem-solving tend to perform better in mathematical tasks, including linear programming.

Teacher 7 reiterated that effective tactics raise students' academic achievement. The teachers

concerted that fight for the provision of decent houses quality education is a must.

He said that,

> *"Appropriate teaching methods will enhance academic performance in learners in schools can really improve our status and in turn the school environment into a decent "(T 7, 13.04.2024).*

Appropriate teaching methods can significantly enhance performance in linear programming (LP) by improving understanding, retention, and application of concepts.

Teacher 13 said,

> *"Teaches should come up with simple ways of teaching linear programming as effort in improving learner academic performance. Many schools have teachers with challenges in delivering linear programming effectively" (T13, 13.04.2024).*

Strategies can address the disablers learners face in linear programming (Mwambazi et al, 2024).

CONCLUSION AND RECOMMENDATIONS

Conclusion

In conclusion, a variety of tasks performed by teachers and staff members can enhance calm learning, which in turn promotes strong academic achievement in classrooms. While teachers have a variety of responsibilities in helping students learn, it seemed that some did not know to help students perform better academically when it came to linear programming. Thus, multiskilling among teachers at all levels becomes essential if teachers are to successfully carry out their responsibility of raising academic performance in Zambian schools.

Recommendations

Through adherence to these recommendations, teachers can proficiently employ linear programming to augment pupil accomplishments, rendering evidence-based judgments that maximize resource allocation and customize learning to suit unique student requirements.

1. Teachers should design dynamic, captivating classes that actively include students in the learning process and employ a range of pedagogical techniques to accommodate individuals with varying learning preferences.
2. Teachers should make sure that students get timely, helpful feedback on their work so they may identify areas in which they can improve.
3. Teachers should motivate students to enhance their academic performance.
4. To avoid burnout, teachers should make sure that their schedules divide teaching, grading, and administrative responsibilities evenly.

REFERENCE

[1] African Development Bank (AfDB). (2019). Capacity Building for Infrastructure Development in Africa. Retrieved from AfDB

[2] Akyüz, D., & Yavuz, E. (2016). The Role of Real-Life Contexts in Students' Understanding of Linear Programming. International Journal of Education in Mathematics, Science and Technology, 4(2), 116-129.

[3] Anderson, A. R., & Creswell, J. W. (2010). Understanding Student Learning Experiences in Linear Programming Through a Mentorship Approach. Journal of Education and Practice, 1(1), 49-59.

[4] Angrosino, M. V. (2007). Doing ethnographic and observational research. SAGE.

[5] Archer, A. L., & Hughes, C. A. (2011). Explicit instruction: Effective and efficient teaching. Guilford Press.

[6] Ball, D. L., & Cohen, D. K. (1999). Developing Practice, Developing Practitioners: Toward a Practice-based Theory of Professional Education. Teaching as the Learning Profession: Handbook of Policy and Practice, 3-32.

[7] Bandura, A. (1997). Self-Efficacy: The Exercise of Control. W.H. Freeman and Company.

[8] Bazaraa, M. S., Jarvis, J. J., & Sherali, H. D. (2010). Linear Programming and Network Flows. Wiley.
[9] Bixby, R. E. (2012). "A Brief History of Linear and Mixed-Integer Programming Computation." Documenta Mathematica, 2012, 107–121. This reference discusses the importance of identifying computational bottlenecks in improving LP solver performance.
[10] Black, P., & Wiliam, D. (1998). Assessment and classroom learning. Assessment in Education: Principles, Policy & Practice, 5(1), 7-74.
[11] Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). "Implicit Theories of Intelligence Predict Achievement Across an Adolescent Transition: A Longitudinal Study and an Intervention." Child Development, 78(1), 246-263.
[12] Bloom, B. S. (1984). The 2 Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring. Educational Researcher, 13(6), 4-16.
[13] Boaler, J. (2013). "Ability and Mathematics: The Mindset Revolution that is Reshaping Education." Forum, 55(1), 143-152.
[14] Bogdan, R., & Biklen, S. K. (2007). Qualitative research for education: An introduction to theories and methods. Pearson
[15] Bonwell, C. C., & Eison, J. A. (1991). Active Learning: Creating Excitement in the Classroom. ASHE-ERIC Higher Education Reports.
[16] Bradley, S.P., Hax, A.C., & Magnanti, T.L. (1977). Applied Mathematical Programming. Addison-Wesley.
[17] Brookfield, S. D. (2012). Teaching for Critical Thinking: Tools and Techniques to Help Students Question Their Assumptions. John Wiley & Sons.
[18] Brown, P. C., Roediger, H. L., & McDaniel, M. A. (2014). Make It Stick: The Science of Successful Learning. Harvard University Press.
[19] Bruner, J. S. (1966). Toward a Theory of Instruction. Harvard University Press.
[20] Cavanagh, M. (2006). Mathematics teachers and working mathematically: Responses to curriculum change. The Mathematics Educator, 16(2), 18-24.
[21] Chi, M. T. H. (2005). Common Sense Conceptions of Emergent Processes: Why some Misconceptions are Robust. Journal of the Learning Sciences, 14(2), 161-199.
[22] Chi, M. T. H., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. Educational Psychologist, 49(4), 219-243.
[23] Chvátal, V. (1983). Linear Programming. W. H. Freeman.
[24] Cobb, P. (1994). Where is the mind? Constructivist and sociocultural perspectives on mathematical development. Educational Researcher, 23(7), 13-20.
[25] Creswell, J. W., & Poth, C. N. (2017). Qualitative inquiry and research design: Choosing among five approaches. Sage Publications.
[26] Creswell, J. W., & Poth, C. N., (2018). Qualitative Inquiry and Research Design: Choosing Among Five Approaches. Sage Publications.
[27] Cuban, L. (2001). Oversold and Underused: Computers in the Classroom. Harvard University Press.
[28] Dahl, H., & Eriksen, K. Å. (2016). Students' and teachers' experiences of participating in the reflection process "THiNK". Nurse Education Today, 36(1), 401–406. https://doi.org/https://doi.org/10.1016/j.nedt.2015.10.011
[29] Daniels, H. (2001). Vygotsky and Pedagogy. Routledge.
[30] Dantzig, G.B., & Thapa, M.N. (2003). Linear Programming 1: Introduction. Springer.
[31] Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of state policy evidence. Education Policy Analysis Archives, 8(1).
[32] Darling-Hammond, L. (2010). The flat world and education: How America's commitment to equity will determine our future. Teachers College Press.
[33] Darling-Hammond, L., & Richardson, N. (2009). Teacher Learning: What Matters? Educational Leadership, 66(5), 46-53.
[34] Deci, E. L., & Ryan, R. M. (1985). Intrinsic Motivation and Self-Determination in Human Behavior. Springer.
[35] Desimone, L. M. (2009). Improving Impact Studies of Teachers' Professional Development: Toward Better Conceptualizations and Measures. Educational Researcher, 38(3), 181-199.

[36] Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From Game Design Elements to Gamefulness: Defining "Gamification". Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments, 9-15.

[37] DuFour, R., & Fullan, M. (2013). Cultures Built to Last: Systemic PLCs at Work. Solution Tree Press.

[38] Dweck, C. S. (2006). Mind-set: The New Psychology of Success. Random House.

[39] Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. Psychological Review, 100(3), 363-406.

[40] Fisher, D., & Frey, N. (2008). "Better Learning Through Structured Teaching: A Framework for the Gradual Release of Responsibility." ASCD.

[41] Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. Review of Educational Research, 74(1), 59-109.

[42] Fredrickson, B. L. (2001). "The Role of Positive Emotions in Positive Psychology: The Broaden-and-Build Theory of Positive Emotions." American Psychologist, 56(3), 218-226.

[43] Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. Proceedings of the National Academy of Sciences, 111(23), 8410-8415.

[44] Fritz, N., & Avsec, A. (2007). The experience of nature: A psychological perspective. Psychology and Aging, 22(1), 4-13.

[45] Gallagher, L., Lawler, D., Brady, V., OBoyle, C., Deasy, A., & Muldoon, K. (2017). An evaluation of the appropriateness and effectiveness of structured reflection for midwifery students in Ireland. Nurse Education in Practice, 22(1), 7–14. https://doi.org/https://doi.org/10.1016/j.nepr.2016.11.003

[46] Glewwe, P., Kremer, M., & Moulin, S. (2009). Many children left behind? Textbooks and test scores in Kenya. American Economic Journal: Applied Economics, 1(1), 112-135.

[47] Gondzio, J. (2012). "Interior-Point Methods 25 Years Later." European Journal of Operational Research, 218(3), 587-601. This paper highlights how continuous monitoring and algorithm tuning can enhance the performance of LP solvers.

[48] Gordon, E. J. (2017). 'The good, the bad and the ugly': A model for reflective teaching practices in coaching pedagogy. Strategies, 30(1), 21–27. https://doi.org/https://doi.org/10.1080/08924562.2016.1251866

[49] Goudreau, J., Pepin, J., Larue, C., Dubois, S., Descôteaux, R., Lavoie, P., & Dumont, K. (2015). A competency-based approach to nurses' continuing education for clinical reasoning and leadership through reflective practice in a care situation. Nurse Education in Practice, 15(6), 572–578. https://doi.org/https://doi.org/10.1016/j.nepr.2015.10.013

[50] Hall, J. M. (2020). A self-critique of facilitating dialogic reflective practice with novice teachers. Reflective Practice, 21(5), 1–14. https://doi.org/https://doi.org/10.1080/14623943.2020.1798920

[51] Han, J., & Yin, H. (2016). Teacher motivation: Definition, research development and implications for teachers. Cogent Education, 3(1), 1217819.

[52] Harackiewicz, J. M., Smith, J. L., & Priniski, S. J. (2016). Interest Matters: The Importance of Promoting Interest in Education. Policy Insights from the Behavioral and Brain Sciences, 3(2), 220-227.

[53] Hattie, J. (2008). Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement. Routledge.

[54] Hattie, J. (2009). Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement.

[55] Hattie, J., & Timperley, H. (2007). The Power of Feedback. Review of Educational Research, 77(1), 81-112.

[56] Hiebert, J., & Grouws, D. A. (2007). The Effects of Classroom Mathematics Teaching on Students' Learning. Second Handbook of Research on Mathematics Teaching and Learning, 1, 371-404.

[57] Hillier, F. S., & Lieberman, G. J. (2015). Introduction to Operations Research. This book emphasizes the importance of modeling and provides numerous examples of real-world applications.

[58] Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2008). Scaffolding and Achievement in Problem-Based and Inquiry Learning: A Response to Kirschner, Sweller, and Clark (2006). Educational Psychologist, 42(2), 99-107.

[59] Ingersoll, R. M., & Strong, M. (2011). The Impact of Induction and Mentoring Programs for Beginning Teachers: A Critical Review of the Research. Review of Educational Research, 81(2), 201-233.

[60] International Literacy Association. (2018). What's Hot in Literacy Report.

[61] Jarvis, J., & Clark, K. (2020). Conversations to change teaching. Critical Publishing.

[62] Johnson, D. W., & Johnson, R. T. (1999). Making Cooperative Learning Work. Theory into Practice, 38(2), 67-73.

[63] Johnson, D. W., & Johnson, R. T. (2009). An Educational Psychology Success Story: Social Interdependence Theory and Cooperative Learning. Educational Researcher, 38(5), 365-379.

[64] Johnson, D. W., Johnson, R. T., & Smith, K. A. (1998). Cooperative Learning Returns to College: What Evidence Is There That It Works? Change: The Magazine of Higher Learning, 30(4), 26-35.

[65] Johnson, D. W., Johnson, R. T., & Smith, K. A. (1998). Cooperative learning returns to college: What evidence is there that it works? Change: The Magazine of Higher Learning, 30(4), 26-35.

[66] Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching. Educational Psychologist, 41(2), 75-86.

[67] Koh, K. T., Chew, M. L. E., Kokkonen, M., & Chew, W. C. E. (2017). The use of reflection-card by elite youth basketball players, head coach and team manager: Effects on players' performance and perceptions of users. Reflective Practice, 18(3), 1–21. https://doi.org/https://doi.org/10.1080/14623943.2016.1267001

[68] Kolb, D. A. (1984). Experiential Learning: Experience as the Source of Learning and Development. Prentice-Hall.

[69] Krueger, R. A., & Casey, M. A. (2014). Focus groups: A practical guide for applied research (5th ed.). Thousand Oaks, CA: SAGE Publications.

[70] Kumar, R., Rajpoot, M. S., & Krishan, K. (2017). Challenges of Implementing Information and Communication Technology (ICT) in Rural Areas of India. International Journal of Research in Engineering, IT and Social Sciences, 7(4), 1-11.

[71] Marshall, T. (2019). The concept of reflection: A systematic review and thematic synthesis across professional contexts. Reflective Practice: International and Multidisciplinary Perspectives, 20(3), 396–415. https://doi.org/https://doi.org/10.1080/14623943.2019.1622520

[72] Marshall, T. D. (2017). Coaching effectiveness: How to encourage a reflective strength and conditioning coach. Professional strength and conditioning, 46, 9–15.

[73] Marshall, T., Keville, S., Cain, A., & Adler, J. R. (2021). On being open-minded, wholehearted, and responsible: A review and synthesis exploring factors enabling practitioner development in reflective practice. Reflective Practice, 22(6), 1–17. https://doi.org/https://doi.org/10.1080/14623943.2021.1976131

[74] Mejía-Arauz, R., Rogoff, B., Dayton, A., & Henne-Ochoa, R. (2018). Collaboration or negotiation: Two ways of interacting suggest how shared thinking develops. Current Opinion in Psychology, 23, 117-123.

[75] National Academies of Sciences, Engineering, and Medicine. (2018). How People Learn II: Learners, Contexts, and Cultures.

[76] National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). Common Core State Standards for Mathematics.

[77] Patall, E. A., Cooper, H., & Robinson, J. C. (2008). The effects of choice on intrinsic motivation and related outcomes: A meta-analysis of research findings. Psychological Bulletin, 134(2), 270-300.

[78] Patton, M. Q. (2014). Qualitative research & evaluation methods: Integrating theory and practice. Sage Publications.

[79] Prince, M. (2004). Does Active Learning Work? A Review of the Research. Journal of Engineering Education, 93(3), 223-231.
[80] Rubin, H. J., & Rubin, I. S. (2011). Qualitative interviewing: The art of hearing data (3rd ed.). Sage Publications.
[81] Rusticus, S. A., & Justus, B. (2019). Comparing student- and teacher-formed teams on group dynamics, satisfaction and performance. Small Group Research, 50(4), 443–457. https://doi.org/10.1177/1046496419854520
[82] Seligman, M. E. P. (2011). Flourish: A Visionary New Understanding of Happiness and Well-being. Free Press.
[83] Smith, J. A., Doe, J., & Brown, K. L. (2020). Dietary Patterns and Cardiovascular Health in Adults: A Study in a Metropolitan Population. Journal of Nutrition and Health, 22(4), 456-469.
[84] Steffe, L. P., & Gale, J. (Eds.). (1995). Constructivism in Education. Routledge.
[85] Stoszkowski, J., & Collins, D. (2017). Using shared online blogs to structure and support informal coach learning—part 1: A tool to promote reflection and communities of practice. Sport, Education and Society, 22(2), 247–270. https://doi.org/https://doi.org/10.1080/13573322.2015.1019447
[86] Sweller, J. (1988). Cognitive Load During Problem Solving: Effects on Learning. Cognitive Science, 12(2), 257-285.
[87] Sweller, J., Ayres, P., & Kalyuga, S. (2011). Cognitive Load Theory. Springer.
[88] Tchamyou, V. S., Asongu, S. A., & Odhiambo, N. M. (2019). The Role of ICT in Modulating the Effect of Education and Lifelong Learning on Income Inequality in Africa. Technology in Society, 59, 101186.
[89] Tomlinson, C. A. (2001). "How to Differentiate Instruction in Mixed-Ability Classrooms." ASCD.
[90] UNESCO. (2014). Teaching and Learning: Achieving Quality for All; EFA Global Monitoring Report 2013/4.
[91] Vescio, V., Ross, D., & Adams, A. (2008). A Review of Research on the Impact of Professional Learning Communities on Teaching Practice and Student Learning. Teaching and Teacher Education, 24(1), 80-91.
[92] Vygotsky, L. S. (1978). Mind in Society: The Development of Higher Psychological Processes. Harvard University Press.
[93] Weimer, M. (2002). Learner-Centered Teaching: Five Key Changes to Practice. Jossey-Bass.
[94] Winston, W. L. (2003). Operations Research: Applications and Algorithms. Brooks/Cole. Hillier, F. S., & Lieberman, G. J. (2010). Introduction to Operations Research. McGraw-Hill.
[95] Winston, W. L. (2016). Operations Research: Applications and Algorithms. Cengage Learning.
[96] World Bank. (2016). Logistics Performance Index Report. Retrieved from World Bank
[97] World Bank. (2018). Africa's Pulse: An Analysis of Issues Shaping Africa’s Economic Future. Retrieved from World Bank
[98] World Bank. (2018). World Development Report 2018: Learning to Realize Education's Promise.