INSTRUCTIONAL LEADERSHIP AND LEARNER OUTCOMES IN SCIENCE AT LOWER SECONDARY PUBLIC SCHOOLS IN UGANDA

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ABSTRACT

The study investigated the relationship between instructional leadership and learner outcomes in science at lower secondary public schools in Uganda. Data were collected from 45 schools from districts of Gulu, Mukono and Kabale. A cross-sectional survey design with both qualitative and quantitative methods was used. The methods included administration of questionnaires, interviews with key stakeholders, document analysis, observations and focus group discussions. The sample comprised of 45 headteachers, 92 science teachers and 362 students. The main findings were that instructional supervision by headteachers and their management teams has a positive correlation with learner outcomes; The headteachers of public rural secondary schools in Uganda did not prioritise instructional supervision; and inadequate supervision of the teaching and learning of science results in poor performance by the learners. In conclusion, effective participatory instructional supervision is a desirable practice which results in continual professional learning and improved science teacher competence and effectiveness. This in turn, results in improved teaching and learning process and consequently leads to improved academic performance in science. The study recommends that head teachers should develop systems and intensify regular participatory and formative supervision of the teaching and learning of science; and the Ministry in charge of Education should institutionalize instructional leadership, train and hold headteachers accountable for the same.

Introduction

The context of school leadership in Africa has been changing. This is reflected particularly in numerous past and ongoing educational reforms and school restructuring movements. At the macro level, the main trend of educational reforms include re-establishment of new national vision and new educational aims for schools, restructuring educational systems at different levels for new educational aims and market driving, privatizing, cost sharing, greater self management and self governance and diversifying school education throughout the world. The roles of school heads in many countries is expanding as a consequence of the devolution of powers from local, regional or national bureaucracies or Ministries to school level and heads of schools have become the public face of the school. At the school site level, the major trends consist of ensuring educational quality, standards and accountability.

Generally, educational leadership and management have to be centrally concerned with the purpose or goals of education which provide the crucial sense of direction (Okumbi, 2007). The main purpose or goal of education is to prepare children for life, nourishing the potential in every learner so that each can connect and contribute to society. In educational institutions, the core purpose of the school head is to provide leadership in all areas of the school to enable the creation and support of conditions under which effective teaching and learning take place and which promote the highest possible standards of learner achievement. As leaders, head teachers provide the vision, framework for high expectation and motivation of staff, students and parents which influence the student outcomes. Consequently, school leadership plays a central role in affecting the educational development of the learners for whom they have responsibility over (Walker and Dimmock, 2002). In fact, school leadership is so critical that Leithwood et al (2004) has ranked it only second to teaching among school related factors in its impact on student

learning and achievement. This is possible when school head teachers provide effective instructional leadership.

The concept of instructional leadership is slowly entrenching into the school systems. According to DuFour (2002), instructional leadership involves setting clear goals, allocating resources to instructions, managing the curriculum, monitoring lesson plans and other academic documents as well as evaluating teachers. Instructional leadership has expanded to include deeper involvement in the core business of a school which is teaching and learning especially through instructional supervision. Instructional supervision is regarded as the process of enhancing the professional growth of the teachers, the curriculum and improving the techniques of teaching in the classroom through democratic interactions between the Teacher and the Supervisor (Okendu, 2012).

In Uganda, education stakeholders have expressed their concern over the poor performance of students in the Uganda Certificate of Education (UCE). Some blame the school administrators or head teachers and the teachers while some blame the students themselves and the parents. Whoever is to be blamed, the fact remains that, the school and its organizational management and leadership has correlation with the academic achievement of the students.

Conceptual Background

Instructional leadership is based on two predominant conceptual models which emerged during the 1980s in the USA. These were developed by Bossert et al (1982) at the Far West Lab for Research and Development in San Francisco who considered it as instructional management, and a complementary model developed by Hallinger and Murphy (1985) which expanded the framework.

The Bossert et al (1982) model sought to more clearly define the construct of 'instructional management'. Instructional management was conceptualized as actions and strategies employed by principals/ headteachers that are intended to impact the school's instructional organization and learning climate with the goal of improving learning outcomes for students. They chose the term "instructional management" because they inferred that this role of the principal/ headteacher revolved around managerial functions concerned with the coordination and control of curriculum and instruction.

The model gives priority to a specific domain of the principal's activities (Robinson et al. 2008); purports that approaches to instructional leadership are shaped by personal characteristics of principals such as prior professional experience, gender, years of tenure as principal as well as attitudes or dispositions (Goldring et al. 2008; Leithwood et al. 2006). They also purport that leadership is influenced by organizational features such as school and district size and complexity, socio-economic status of the community, and socio-cultural features of the education environment (Belchetz and Leithwood 2007; Goldring et al. 2008; Hallinger and Heck 2011c); that the principal's effects on student outcomes are also mediated by features of the school (Hallinger et al, 2011); and that the ultimate effectiveness of the principal's efforts is based upon the impact achieved on students learning and development (Mulford and Silins 2003, 2009).

The second model was by Hallinger and Murphy (Hallinger et al. 1983). The model presented a

conceptual framework that incorporated three dimensions: defining the School Vision and Mission, Managing the Instructional Program, and developing a Positive School Learning Climate (Hallinger et al. 1983; Hallinger and Murphy 1985). They further identified vision and goals

as the most significant avenue through which school leaders impact learning. Vision refers to a broad picture of the direction in which the school seeks to move such as educating the whole child. In contrast, goals refer to the specific targets that need to be achieved on the journey towards that vision (Hallinger and Heck, 2002). In a meta-analysis of the school leadership effects literature, Robinson et al (2008) reaffirmed that vision and goals are the most significant avenue through which school leaders impact learning.

Both tend to converge on the fact that the ultimate effectiveness of the principal's efforts is based upon the impact achieved on students learning and development (Mulford and Silins 2003, 2009). Although Bossert and his colleagues initially employed the term instructional management, over time instructional leadership came to be more commonly used by scholars and practitioners. The formal distinction between these terms lies in the sources of 'power' used to achieve results. Instructional leadership became the preferred term due to recognition that principals who operate from this frame of reference rely more on expertise and influence than on formal authority (i.e., position power) to achieve a positive impact (Hallinger, 2003; Leithwood et al. 2008; Knapp et al. 2010). Since learning is relational, instructional leadership fits the preferred term.

Situational Analysis in Uganda

The Government of Uganda has recognises the importance of quality education and specifically of science in the socio-economic development of the country and the realisation of the national vision 2040 which aims at transforming from the peasantry to a prosperous and modern country. Consequently a number of initiatives have been implemented to promote science education at various levels of education. In addition, specific interventions targeting improvement of science teaching and learning at secondary level have also been implemented. These include the

implementation of Science Policy 2005 that made sciences compulsory at lower secondary; rehabilitation and/or construction of science laboratories in various schools; provision of Science Kits and laboratory equipment to various rural schools and institutions; recruitment of more science teachers; organising in-service training for secondary science and mathematics teachers under In-Service Secondary Teacher Education Programme (INSSTEP) in 1994-2000 and Secondary Science and Mathematics Teachers (SESEMAT) from 2007 to date; introducing computer education and laboratories and e-science learning, affirmative action on financing science courses in government Universities and Tertiary institutions (Ministry of Education and Sports, MoES, 2006).

In spite of all these efforts, the academic performance of students in science subjects at the end of lower secondary in Uganda Certificate of Education (UCE) has remained poor over the years.Analysis of student performance in science for ten years between 2005 and 2014, according to Uganda national Examination Board (UNEB), show that average performance at distinction level in Biology, Chemistry and Physics (core science subjects) is as low as 3%. Over the same period of time, the failure rate in the same subjects stands at 53% which confirms poor performance in science. The high failure rate at lower secondary imply that many young people complete that level with inadequate science knowledge and skills to carry on with science at higher levels or to apply in the world of work and contribute to their personal, community and national development. The overarching question is "what can schools do to reverse this trend? What will be the contribution of school leadership and management? How do the practices of the school leaders in supervising the teaching and learning process impact on learner achievement in science?" The study will venture to find the answers to some of these questions.

Purpose

The purpose of the study was to determine the relationship between head teacher instructional supervision practices and academic performance in lower secondary science education in Uganda.

Objectives

1. Assess the connection between instructional supervisory practices, and teacher Classroom behavior.
2. Determine the connection between instructional supervisory practices and levels of student achievement in science.
3. Draw lessons from the connection between instructional leadership/ supervision and student achievement?

Literature Review

The review analysed the literature mainly on instructional supervisory practices and teacher classroom behavior; and instructional supervision and levels of student achievement.

Instructional supervision and Teacher classroom behavior

The main purpose of instructional supervision is to ensure that there is improvement of classroom instruction, the learning situation and the quality of learning in the school. Through effective supervision of instruction, school administrators acting as instructional leaders, can reinforce and enhance teaching practices that will contribute to improved student learning.

According to Acheson & Gall (2003), an instructional leader is an administrator who emphasizes the process of instruction and facilitates the interaction of teacher, student and curriculum. Instructional leadership involves setting clear instructional goals, allocating resources

to instruction, managing the curriculum and evaluating teachers. It focuses on strengthening teaching and learning (Kruger 2003, Musungu and Nasongo 2003; Sidhu and Fook 2010); student assessment (DuFour, 1999; Wiggins, 2004); professional development, data driven decision-making and accountability; and managing instructional programmes and promoting a positive learning climate (Hallinger, 2000). Blasé and Blasé (1999) expressed instructional leadership as specific behaviours such as modelling effective instructions, soliciting opinions, making suggestions, giving feedback to teachers, supporting collaboration, providing professional development opportunities and appreciating effective teaching. So, instructional leadership implies creating a climate of integrity, inquiry and continuous improvement and providing systems for instructional supervision and continuous constructive feedback (Acheson & Gall, 2003). Hence, effective instructional supervision provides a school climate that encourages teachers to prepare and deliver the lesson effectively (gives confidence and mastery), and assess systematically (Kizlik, 2010).

Strong instructional leaders increase teacher effectiveness, which in turn, improve student achievement (Wiggins and McTighe, 2005). Hence, head teachers' instructional leadership and supervision facilitate school level strategies aimed at academic improvement (Opdenakker & Van Damme, 2007; Kyriakide et al, 2010). These include ensuring effective use of the resources such as the laboratory and other school facilities (Kulbir, 1999); ensuring motivation, commitment and regular professional development of teachers (Kyriacou, 1997); and evaluating the school curriculum (Takemura, 2008).

Research further shows that effective instructional supervision should be formative and collegial. According to Jackson (2001), formative supervision is a process whereby the school administrator assists the classroom teacher to improve his/her teaching and students' learning.

School heads have to keep in mind that formative supervision is more than just routine classroom visits and evaluation of the teaching and learning process. It involves aspects of goal setting, follow-up visits, mentoring and coaching, continuous feedback on progress (Skretta, 2007) and provision of additional support to implement changes and professional development opportunities designed to improve teachers' classroom performance through analysis of data from classroom events. This is sometimes referred to as formative clinical supervision which is a teacher–centred approach and promotes continuous improvement.

In this type of supervision, the headteacher or his/her representative is seen as a facilitator, trainer and educator (Sergiovanni and Starrat, 2006). Formative supervision therefore exhibit effective and collegial dialogue to encourage teacher reflection and professional growth (Blasé and Blasé, 2000). It improves teachers' confidence and competence (McEwan, 2000), teacher motivation, satisfaction, self- esteem, efficacy and sense of security and improved performance because it is a participatory process. Zepeda (2007) further argues that teachers benefit highly when formative supervision is combined with summative teacher evaluation.

However, the consensus in the literature regarding this issue is that instructional leadership is seldom practiced (Flath, 1989) and effective instructional leaders are distinctly in the minority (Fullan, 1991). Stronge (1993) calculated that 62.2% of the elementary principal's time is focused on school management issues, whereas only 6.2% of their time is focused on instructional leadership program issues. He adds,

"A typical principal performs an enormous number of tasks each day - but only 11% relate to instructional leadership" (p. 32).

Limited focus on instructional leadership reveals misalignment in the focus of most school leaders. As Stronge (1993) argues, the principal/ head teacher, as an instructional leader, is the pivotal point within the

school who affects the quality of individual teacher instruction, the height of student achievement, and the degree of efficiency in school functioning. Similarly, Flath (1989) also argues that, instructional quality becomes top priority of the school through effective instructional leadership because it focuses on improving the classroom practices of the teachers and encourages them. Therefore, if schools are to progress, the head teachers cannot allow daily duties to interfere with the leadership role in curriculum implementation through supervision.

Headteacher instructional Supervision practices and Learner Achievement in science

The student outcomes are determined by a number of in and out of school factors. These include family background, student characteristics and school inputs such as availability of teacher, instructional materials and school administration support and supervision. However, research shows that head teachers who provide teachers with instructional leadership and collegial support supervision improve student achievement more than those who provide transformational leadership (Robonson, Lloyl and Rowe, 2008; Seashore-Louis, 2010). For example, the head teacher who recognizes the crucial importance of science can use his influence, power and authority to help shape critical approaches to science education reform efforts.

According to Rhoton and Shane (2006), head teachers can use the following approaches to support science education reform: creation of an instructional organisation and climate that are conducive to school-based initiatives and innovations so that all students can learn science in some meaningful way. This involves creation of a clear vision of effective science teaching and learning as well as goals that reflect content knowledge; providing high quality, appropriate and adequate instructional materials that support coherent presentation of important

science concepts to all students; supporting alternative assessment methods that more accurately measure deep understanding and a variety of skills and competences as stipulated by Bloom's Taxonomy (Anderson & Krathwohl, 2001); supporting ongoing and long term professional development of science teachers through mentoring of younger teachers, and exposure visits; maintaining class-size appropriate for science discipline; hiring new competent science teachers; communication to teachers about research and innovative practices in science. Providing support supervision to the teaching and learning process gives head teachers a deeper understanding of where they could be of assistance to teachers (Brewster, 2005). Hence instructional leadership plays a key role as *"the driver for change"* (Bryk et al., 2010: 61) and promoter of improved student achievement (Waters et al, 2003).

Therefore, effective instructional supervision practices facilitate effective learning because the head teacher will be kept abreast with the requirements for effective teaching so as to provide teachers with required science instructional facilities, materials and resources (Rhoton and Shane, 2006), and monitor their utilisation to ensure the link between theory and practice (Uganda Secondary Education Sub-sector Report, Seweje, 2000) and give feedback to improve the effectiveness of teaching and learning process.

According to Aladejana and Aderibegbe (2007) and Adediwura & Tayo (2007) effective teaching and learning of science is activity-based and leads to improved students' academic achievement. It is widely accepted that science is better taught using discovery or the experimental approach because students learn to handle apparatus, think independently and draw conclusions on the basis of practical observations (Mohan, 1995). In addition, the subject matter becomes more comprehensible, forgetting is minimised, and it is more likely to lead to transfer of knowledge and to acquisition of favourable attitudes towards a particular subject and

towards learning in general. When students are given opportunity to use the language of science and to experiment with nature and other scientific experiences, the outcome is enhanced conceptual understanding (Mercer et al, 2004; Zohar & Nemet, 2002). Thus students are likely to be highly motivated, score higher on all types of tests, and gain critical insight into the subject matter (Comb & Snugg, 1995) and can engender an increase in the level of achievement in science especially of low achievers (Mohan, 1995; Kyriacou, 1997). If the head teachers promote consistent support supervision in collegial manner, it is assumed that the teachers will maximize the use of available science facilities and the students will highly benefit leading to improved academic performance.

However, some other scholars who consider school administration as the most important role of head teachers and consider instructional supervision as a burden to the head teacher. Day and Sammons (2013) assert that, expanding the role of a school leader to include instructional supervision, is adding to the administrative demands of leading a school to excellence; making it difficult for many school heads to successfully fulfill all of their obligations. The additional responsibilities imposed on principals or head teachers in many countries make great demands on the post holders (Walker and Dimmock, 2006).

Besides all these roles, the assumption from the general public is that the absence of effective leaders, positive school climates created by the head, and positive attitudes of teachers can, directly or indirectly, influence school performance and student achievement (Kruger, Witziers and Steegers,2007; Waters, Marzano, and McNulty, 2004;). It is argued that, leadership in schools play a pivotal role in all phases of the school improvement and development processes. The school head is considered vital and is held responsible for keeping the school as a whole in mind and for adequately coordinating the individual activities during the improvement processes. School leadership the world over is considered

as a professional driving force and mediator for the development of the school towards sustainable improvement.

School heads empower teachers and contribute to the school improvement journey through empowerment and the spreading of good practice initiatives generated by teachers. Leithwood et al., (2004) show that, the impact of student outcomes is likely to be greater where there is direct leadership involvement in the oversight of and participation of leadership in curriculum planning and ordination and teacher learning and professional development. In many parts of the world, including both developed and developing countries, there is increasing recognition that schools require effective leaders if they are to provide the best possible education for their learners. Leithwood et al., (2004:4) argue that, "*School leadership is second only to classroom teaching as an influence on pupils achievement".* They concluded that, *"there is no single documented case of a school successfully tuning around its pupil achievement trajectory in the absence of talented leadership" (p.5).*

Methodology

The methodology explains the study design, population, sample with the sampling techniques and the data collection methods.

Study Design

A cross-sectional survey design was adopted. According to Cohen et al (2010), cross-sectional surveys produce findings more quickly; they are less likely to suffer the control effects experienced in longitudinal surveys where data is collected over time; are more likely to secure cooperation from the respondents on a one-off basis and are less expensive and yet the results can be generalised to a large population. According to Creswell (2009), studies concerned with views, opinions, perceptions and feelings of respondents on relationships are best investigated through this type of design.

Academic performance in science is a nationwide issue in Uganda. So the survey design was preferred because determination of the relationship between school management practices (independent variable) and academic performance (dependent variable) required the data that had a national stance. The cross-sectional survey design made it possible for data to be collected from a fairly large sample on 'one shot' basis with a rapid turnaround in data collection (Cohen et al, 2010). This design was preferred because it is economical and efficient and hence considered most appropriate. Since rural government secondary schools on which the study focused are many and scattered in the whole country, the data was collected from a representative sample of schools (Bell, 2004) due to time and financial constraints.

The study sample represented the cross-section of the different target populations (Kumar, 2005) including head teachers, science teachers, and students because they are all directly involved with the study variables. Although cross-sectional surveys tend to be highly quantitative, the design incorporated qualitative aspects to give a holistic picture of the data collected in determining the relationship between school management practices, and academic performance in science education because management practices are normally contextual.

Study Population

The population of this study was drawn from 595 government secondary schools classified as rural in the Education Management Information System (EMIS, 2013). The assumption was that each school has one head teacher, at least three science teachers and two streams of sixty students each. If all the rural government secondary schools were reached, it would have translated into an accessible population of 595 head teachers, 1785 science teachers, assuming that each school has at least a teacher for each of the core science subject of Biology, Chemistry

and Physics, and 71,400 senior four students (EMIS, 2013). The rural government secondary schools were targeted because they have a lot of similarities in terms of funding sources, infrastructure and facilities, centrally recruited and deployed head teachers and science teachers, and approximately the same entry scores for students at senior one. Targeting rural government secondary schools reduced on the extraneous variables such as student ability, teacher quality and variation in science facilities. Private schools were left out because of the variations in governance and management, provisions of facilities and recruitment of teachers, and variation in student abilities which may influence the performance of students in science differently.

The head teachers whose management practices were being investigated were key informants. Similarly, the science teachers participated in the study because their performance is directly affected by the head teachers' management practices and teacher performance affects the motivation and academic performance of the students. In addition, students of senior four were chosen to provide additional data because they all study sciences under the policy of compulsory sciences and had stayed in the school for almost four years.

Sample and Sampling Technique

The sample was drawn from three of the four traditional regions of Uganda to give it a national character and provide for generalization of the findings and conclusion simple random sampling. One district, with a reasonably large number of rural government secondary schools, was sampled from each of the three regions using a two stage procedure. First, stratified sampling technique was used to get the districts within each region with at least eight rural government secondary schools using EMIS data of 2009. This generated 7 districts in the central region, 12 districts in western region and 6 districts in the northern region. At the

second stage, simple random sampling was used to pick one district from each of the three regions. The districts sampled were Mukono in central, Kabale in Western and Gulu in Northern region respectively.

The school sampling frame comprised of 9 schools in Gulu, 18 schools in Mukono and 24 schools in Kabale giving a total of 51 schools. Using Krejcie and Morgan's Table (Amin, 2005), 51 schools generated a sample of 45 schools. The proportion allocation in simple random sampling was used to select the 45 schools. Each district contributed to the sample a number proportional to its size with each school having equal chances of being selected.

Using the assumption that each school would have one head teacher, at least 3 science teachers and two streams with 120 students in senior four, a population of 45 head teachers, 135 science teachers and 5400 senior four students was generated. Using Krejcie and Morgan's Table (Amin, 2005), this gave a sample 92 science teachers and 362 students. The implication was that only two science teacher and eight students could be sampled from each school. Simple random sampling was used to select the teachers and students in each school.

Data Collection Methods

A variety of quantitative and qualitative methods were used to give holistic information since head teachers' management practices are attitudinal and perceptual (Enon, 2002; Sekaran, 2003). The various methods made it possible to establish conditions, practices and perceptions that describe and explain the relationship between the headteacher instructional leadership practices and academic performance in science education. The data collection methods included surveys with self-administered questionnaires based on a five point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree, interviews, document analysis, observations and focus group discussions (FGD). The data generated

triangulated to give a holistic picture.

The observations were recorded and used to supplement information collected using other methods. Observations generated issues which were followed up in interviews with the head teachers and teachers. To avoid the observer and one-time effect and be objective (Robson, 1993), the researcher used a checklist, interviews and the available evidence in documents to make judgements on aspects being observed. The focus group discussions with a group of 5 to 7 senior four students and 2 to 3 teachers that did not participate in filling the questionnaire in some of the schools gave supplementary evidence.

Findings

The study findings focused on establishing the connection between instructional supervisory practices and teacher Classroom behavior and how that influences the levels of student achievement in science.

Headteacher instructional supervisory practices and teacher Classroom behavior

The results of the teacher questionnaires revealed that headteacher instructional supervision practices of the teaching and learning process were low. While a fair number of head teachers or their representatives (61%) assessed lesson preparation regularly, only 20% observed lessons regularly, 16% gave constructive comments after lesson observation, 31% has functional systems for teacher peer lesson observation and 30% had systems to monitor class based continuous assessment.

Supervision of Preparation to teach

Analysis of data from teachers' questionnaires on supervision of preparation for teaching revealed that practice is average (61%). Field observation revealed that in 20% of the schools, the school management

had facilitated lesson preparation by providing printed scheme books with a provision for lesson plans, template for monitoring students' class attendance, recording continuous assessment marks and record of work covered. However, the schemes of work booklets were not effectively utilized. Only schemes of work were prepared but the lesson plans, were not prepared. According to the records at the offices of the Director of Studies (DOS), supervision of preparation was taken very seriously in only 13% of the schools. In many of these schools, there were no systems to ensure that the heads of departments checked the schemes of work for accuracy of the content or that the schemes of work submitted were followed during the teaching. Where preparation for teaching was taken seriously, the head teachers and their management teams supervised the actual process and provided lunch for the teachers as an incentive to ensure schemes of work are done a few days before the beginning of each term so that teaching can start promptly when the term begins.

Consequently, in most schools the teachers just prepare schemes of work and lesson notes or use their old notes without clear plans and objectives or outcomes for each lesson. It was noted that preparation of lesson plans was resisted except where is was a clear outcome, supervised and with consequences because it is time consuming and the science teachers in rural schools work in more than one school due to high demand and inadequate remuneration. Hence lack of systems or inadequate or inconsistent supervision of preparation for teaching science encourages most science teachers to do the minimum. Lack of or inadequate preparation for teaching science affects lesson delivery, student learning and performance.

Supervision of the teaching and learning process

The teaching of Science is further affected by low level of supervision of the teaching and learning process. Results show that only 20% of science

lessons were regularly observed by the school leadership and management team and 16% gave constructive comments after lesson observation. This implies that in 84% of the schools investigated, science teachers never get a chance to know the quality of their teaching and how they need to improve. One of the science teachers said, *"No one has ever observed my teaching for the last twenty years"*. Many headteachers concentrate on other administrative activities leaving supervising the teaching and learning process unattended. They did not consider lesson observation as one of their critical roles and lacked management systems to do it. Others especially without science background indicated that they lacked the necessary competences. As a result, teacher absenteeism is high, poor methods of teaching are continuously used and schools have no basis for conducting school-based continuous professional development for science teachers. The low supervision practices by head teachers in rural government schools were highly associated with poor attitudes towards their work. They focus on the challenging circumstances such as inadequate teachers and equipments instead of supporting the teaching and learning process to maximize the available resources. In fact, visit to the laboratories showed that even the available facilities were not effectively utelised partly due to lack of supervision.

The evidence for systematic lesson observation was found only one school (2.2%) of the 45 schools visited. The head teacher worked with the head of science in the school and observed each teacher at least twice a term after thorough discussion and agreement with teachers about the benefits of lesson observations. The observation comments were in teachers' files and the headteacher reported marked progressive improvement in the teaching of science. He confessed his excitement *"I am excited about the outcome of lesson observation. Analysis of the comments given on subsequent observations indicated that teachers were progressively improving"*. However, no marked improvement had been realized in 10%

of the schools where lesson observation was informal, not documented, individual teachers not given feedback and lacked follow up.

In addition, the peer lesson observation practiced in only 30% of the schools was a new innovation mainly through the national effort under SESEMAT rather than institutional effort. Some headteachers had started appreciating it. For example, one headteacher confessed, "I highly appreciate the *peer lesson observation started recently in this school after the last SESEMAT training and intend to make it a school programme so that it can be done in every subject".* The practice was appreciated by teachers because it gives teachers collegial support in a non-threatening friendly environment. Therefore, peer supervision is a desirable practice for the improvement of the teaching and learning of science. However, it was not yet mainstreamed into the school systems for sustainability.

In the few schools where instructional supervision was done, school leadership were providing model instructions, indentifying teachers' strengths and weaknesses, making suggestions for improvement, supporting collaboration such as team planning and team teaching, giving feedback to teachers, and providing professional development opportunities, with the ultimate objective is to ensure effective learning of the students.

Supervision of School-based Assessment

With regard to headteacher supervision practices in the area of class-based continuous assessment, the study revealed that only 30% of the head teachers had some form supervisor on assessment. The schools referred to the programmed summative assessment in form of tests at the beginning of term, mid-term and end of term. There was no evidence of monitoring continuous class assessment such as home work, project work, practical work, end of topic or unit and other informal assessments. The head teachers revealed that the practice of supervising internal

assessment was low. They seem to have left it to individual teachers and to chance.

Supervision of assessment was inadequate because it was limited to summative assessment. The test results were recorded and used to determine the performance of students at the end of term rather than using them progressively to improve the teaching and learning process. For example, one headteacher confessed that *"Our education system is examination oriented so we focus more on tests which are similar to the external examinations"*

When responding to the question, **"how do you make sure that you have an effective assessment system in the school"?** Head teachers in only 30% of the schools said they had put systems in place for regular class assessment monitoring. These included randomly sampling and checking students' exercise books, ensuring regular tests were done and regular analysis of the performance of the students. Having a system of regular monitoring and head teacher participation encourages teachers to take continuous class assessment seriously. One headteacher reported that, *"The teachers give weekly assessments. I have to check to ensure that it has been done. I also pick a sample of students' exercise books to confirm that they are being assessed regularly. This close follow up has led to general improvements. After adopting this system, all the classes had higher averages at the end of term than before".*

This suggests that use of assessment results to inform the teaching and learning process significantly influence the academic performance of students in science. It further confirms that effectively monitored continuous assessment leads to improved academic performance.

Instructional supervisory practices and Student achievement in science

Analysis of the students' responses to the open-ended question in their questionnaires on the factors that negatively affect their performance in science revealed that inadequate supervision of the teaching and learning process featured highly. Students expressed disappointment that the head teachers and their management teams did not supervise what teachers do and indicated that their teachers behave and treat them unprofessionally in a manner that discourages them. More than 40% of the students used the following words to describe their teachers: *"Not regular", "miss lessons", "consistently come late", "have poor syllabus coverage", "uncommitted and unserious", "run through the syllabus without explanations", "teach theoretically"*. The students reported that these unprofessional practices go unnoticed due to lack of supervision.

The students further indicated that even during the actual lesson delivery, the science teachers de-motivate them by the way they teach and respond to the students' questions. They revealed that the teachers were *"boring", "too fast", "gave no explanations", "made students copy notes all the time" and "the teaching was highly theoretical"*. They also described their teachers as*: "arrogant, rude, rough, insulting, embarrassing, un-cooperative, hash, biased and very hostile"*. According to the students all these unpleasant things are happening in the science classes but remain unnoticed by the school management. Such teacher practices discourage and de-motivate the students. They have a negative impact on the students' attitude, understanding of the science lessons and their academic performance. The students recommended that school management should intensify supervision of science lessons. The students wrote recommendation statements such as: *"The head teacher should observe regularly whether the teaching is good or not", "the management should carry out discussions with teachers of science*

subjects", "the head teacher should improve supervision of teachers", "the head teacher should supervise the science teachers when they are teaching". These quotes confirm that supervision of science teaching by school management is very low and this has a negative effect on the teaching and learning process. Learning is a sensitive process that is heavily influenced by psychological environment, and if the obtaining conditions are hostile, effective learning may not take place. Therefore, inadequate instructional supervision in rural government schools is most likely contributing to poor performance.

Test of Relationship between Instructional Supervision and Academic Performance

Using SPSS statistical package, the data on instructional supervision generated from the close-ended questions in the questionnaires for head teachers, teachers and students was subjected to the chi square test of independence. It tested the hypothesis ***"****There is no relationship between instructional supervision and academic performance in science education in lower secondary schools in Uganda".* The Table 1 below gives the output.

Table 1: Chi-Square of Instructional Supervision and Academic Performance

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.191	2	0.004
Likelihood Ratio	11.269	2	0.004
Linear-by-Linear Association	10.907	1	0.001
N of Valid Cases	490		

The table above gives the output of the chi square test for independence for the null hypothesis that *"There is no relationship between*

instructional supervision and performance in science education in lower secondary schools in Uganda". The results of the chi square test, $\chi 2$ (2, n=490) = 11.19, p=0.004, indicate that there is a significant relationship between instructional supervision and academic performance in sciences. The hypothesis is therefore rejected.

In addition, the strength of the relationship between instructional supervision and academic performance in science was determined using contingent coefficient. The output r (490) = 0.149, p=0.004 is statistically significant and positive but the relationship is weak. Since the relationship is positive it implies that high level of practice will result in high performance and vice verse. This validates the findings of the study already given. However, the weak relationship suggests that performance in science does not depend entirely on instructional supervision. Other factors such as availability of science teachers, facilities and equipments, attitudes and more contribute to student performance in science.

Further analysis done to test the relationship between headship experience and instructional supervision showed that $\chi 2$ (2, n=45) = 0.792, p= 0.373. Since p > 0.05, it implies that there is no statistically significant relationship between headship experience and the level of instructional supervision. This suggests that the practice of instructional supervision does not depend on the number of years the head teacher has been in headship but rather on the significance he or she attaches to instructional supervision.

Discussion of the findings

The study brought out three major findings. First of all, it was clear that instructional supervision by head teachers and their management teams has a positive correlation with learner outcomes. Secondly head teachers of public rural secondary schools in Uganda did not prioritise instructional supervision. Thirdly, inadequate supervision of the teaching and learning of science results in poor performance by the learners.

Impact of instructional supervision on learner outcomes

In Uganda, headteachers are expected to play a three-fold role as school managers, instructional leaders and administrators. Since the focus of education is the learner, the core business of any school is to ensure effective learning so that all the learners therein maximise their potential (Kruger, 2003; Musungu and Nasongo, 2003; Sidhu and Fook, 2010). Supervision should translate into good performance in both curricular and co-curricular activities. It is the headteacher's responsibility to mobilize all stakeholders and resources, and spearhead formulation and implementation of school-based policies and systems to make it happen. In the School Excellence Model (SEM) in Singapore, purposeful leadership puts students first and sees teachers as key to make quality education happen (Tee & Chan, 2008). Instructional supervision when well done on regular basis does not generate additional pressure for the teachers which may be counterproductive as Lee et al (2012) argues, it instead helps teachers to improve and excel.

The findings of this study reveal that head teachers are pre-occupied with administrative work rather than the supervision of the core business which is effective teaching and learning. This finding contradicts the modern thinking that places instructional leadership as one of the central purposes of the principal/ head teacher (Dufour, 2001; Fullan, 2001, 2003). The administrative duties should be to reinforce rather than substitute instructional supervision. This is because instructional leadership involves setting clear instructional goals, allocating resources to instruction, managing the curriculum and evaluating teachers. The head teacher can provide both direct instructional leadership such as setting and ensuring that goals lead to effective teaching and instruction (Robinson et al, 2011) and indirect instructional leadership, for example, organising instructional programs, protecting instructional time and much more (cited in Louis and Robinson, 2012). The researcher agrees

with Brewer (2001) who argues that the head teacher as an instructional leader creates a climate of integrity, inquiry and continuous improvement of the teaching and learning process and student academic performance.

As a school manager, one of the roles of the head teacher is to take the lead in developing school-based policies and systems for continuous improvement. Such systems would include teacher supervision for improving teaching and learning (Kruger, 2003; Tee & Chan, 2008). Systematic and consistent professional teacher support supervision of the entire teaching and learning process especially lesson observation helps the teachers to identify areas for improvement. It also gives the school management the basis on which to objectively assess or appraise the performance of teachers. Lack of school systems for regular monitoring of lesson preparation, and delivery deprives the science teachers the opportunity of support supervision which enhances the quality of teaching. Teachers continue delivering lessons in the same way regardless of whether the students understand or not. This has impact on the students' learning, understanding and academic performance from year to year.

Effective instructional supervision should be participatory. If the supervision is basically management-based without sufficiently involving teachers and students, they may look at it as an inconvenience or intrusion into the teachers' freedom. As Lee et al (2012) argues, instructional supervision, if not well handled may generate additional pressure for the teachers which may be counterproductive. However, when teachers are fully involved in the preparation for supervision, receive and discuss constructive feedback that is given in a collegial manner in a climate of integrity, it will result in continuous improvement of the teaching and learning process (Acheson & Gall, 2003). Instructional supervision will encourage teachers to prepare effectively (Kizlik, 2010), put more thought and effort into their lessons and their job, enable them to own

the content they teach and the methods they use and take care of multiple intelligences of their students in teaching and assessment, and enjoy their work.

In addition, when students are involved in the processes of instructional supervision, they are not scared by the presence of the head teachers or any other members of the management team in their classrooms and other learning areas. Instead, they appreciate that it is done for their good and become more focused (Kruger, Witziers and Steegers, 2007). Regular presence of the head teachers or members of the management teams in classrooms and other student activities will not only improve the discipline but also give the management a clear understanding of the students' learning environment and the issues that affect their learning. Consequently student participative instructional supervision will most likely improve the teaching and learning process resulting in good academic performance (Sidhu and Fook, 2010).

Moreover, effective instructional supervision supports continual professional learning to improve teacher instructional abilities and supports individual teachers by monitoring and supervising their work at preparation, delivery and assessment (Seashore-Louis et al, 2010). This leads to teacher professional growth, motivation to demonstrate improvement, increased self-efficacy and self-confidence. It also reduces abseentism of both teachers and students (Branch et al, 2012), enables teachers to reflect on their work, and encourages collaboration with colleagues and continued ongoing professional development (Barry, 2010). Effective instructional supervision helps the teachers and the learners to realize their full potentials in their respective careers and makes teachers more effective. As Robinson et al (2008) established, effective teachers improve student academic performance because of conducive learning and teaching environment.

However, since secondary school head teachers cannot be expected to have expertise in all the subject areas their schools offer, their ability to give guidance on instruction is generic and rather limited. It can be argued that effective head teachers have practices and systems that empower heads of departments or subjects who are in a position to offer subject specific instructional supervision to do so. When instructional supervision is participatory, decentralised, consistent and collegial, and is done by the head of department with subject expertise, teachers are motivated to use appropriate teaching methods and to handle the curriculum as stipulated by Bush (2006). Improved teaching as a result of instructional supervision and support enables the students to learn at appropriate pace and results in improved learning and academic performance (The Wallace Foundation, 2012).

Therefore, effective instructional supervision which improves learning outcomes is nested in a learning environment where each individual learner is happy, safe, confident, making good progress and achieving success (Shushila, 2004). Such an environment is realized when head teachers use democratic or participative practices that involve all teachers and students in planning and executing the supervision plans, and effective delegation in providing instructional supervision in a professional and regular manner, and where teachers are empowered to identify weaknesses in their practices and improve on them.

Conclusion

In conclusion, the extent to which the school factors influence the academic performance and outcomes of the students mainly depend on the leadership of the head teachers. In addition, effective participatory instructional supervision is a desirable practice which results in continual professional learning and improved science teacher competence and effectiveness. This in turn, results in improved teaching and learning

process and consequently leads to improved academic performance in science. Therefore, effective instructional leadership should be prioritized and practiced by all secondary school leaders to ensure effective teaching and learning of science and consequently improved performance in science.

Recommendations

1. The head teachers should provide instructional leadership by developing systems and intensifying regular participatory and formative supervision of the teaching and learning of science if the learning outcomes are to improve.

2. The Ministry in charge of Education should institutionalize instructional leadership, train and hold headteachers accountable for the same. Holding headteachers accountable will motivate them to give it the priority it deserves.

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