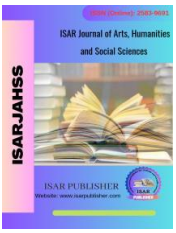
OPEN ACCESS



ISAR Journal of Arts, Humanities and Social Sciences
Vol-2, Iss-8 (Aug- 2024)
Abbriviate Title- ISAR J Arts Humanit Soc Sci
ISSN *(Online)*- 2583-9691
https://isarpublisher.com/journal/isarjahss

OPEN ACCESS

Teaching-Learning Facilities and Students' Academic Performance in Chemistry Subject in Lower Secondary Schools in the Era of Quality Assurance Implementation

Maate Clive[1*], Moses Muhindo Kibalirwandi[2], and Adrian R Mwesigye[3]

[1]PhD graduate of Mbarara University of Science and Technology.

[2]PhD candidate at Mbarara University of Science and Technology.

[3]Associate Professor at Mbarara University of Science and Technology. .

***Corresponding Author**
Maate Clive

PhD graduate of Mbarara University of Science and Technology.

Article History
Received: 17.07.2024
Accepted: 29.07.2024
Published: 14.08.2024

Abstract: This research paper explores the impact of teaching-learning facilities on students' academic performance in Chemistry at the lower secondary school level within the context of quality assurance policy implementation. The researchers utilized statistics from the doctoral research data sets of Maate, (2023) and Kibalirwandi, (2024). The research investigates how the availability and quality of instructional resources—such as laboratories, textbooks, and digital tools—affect student outcomes in chemistry. Additionally, the article examines the interplay between teachers' dispositions, compensation, and morale, and their influence on the effectiveness of these facilities. Utilizing a mixed-methods approach, the research combines quantitative and quantitative data analysis of students' performance with qualitative insights from teacher interviews and classroom observations. Results reveal that well-resourced teaching environments significantly enhance student engagement and academic achievement. The paper also addresses the role of quality assurance policies in shaping teaching-learning facilities and their impact on educational equity, reflective practices, and lifelong learning.

Keywords: Disposition, reflective teaching, quality assurance, morale, and social justice.

Cite this article:
Clive, M., Kibalirwandi, M. M., and Mwesigye, A. R., (2024). Teaching-Learning Facilities and Students' Academic Performance in Chemistry Subject in Lower Secondary Schools in the Era of Quality Assurance Implementation. *ISAR Journal of Arts, Humanities and Social Sciences*, *2*(8), 73-80.

Introduction

Teaching-Learning Facilities in chemistry teaching include; textbooks, periodic tables, online multimedia lessons, wall charts, flip chart sets, and laboratory apparatus. Hands-on experiments are crucial for understanding chemical concepts. The key principle is to encourage inquiry and develop laboratory skills such as recording, observation, measurement, reflection, and real-world application of chemistry (Gibbs, 2020; Maate, 2023). The real-world application of chemistry may be known as competence-based learning where students work on projects that involve applying chemistry concepts to the real world. Technology such as simulations and visualization help students understand complex chemical processes. Simulation methods help students learn both concepts and applications in a nuanced way in an unforeseen situation. Students often find them more deeply engaging than other activities, as they experience the activity first-hand. The successful integration of process simulation using CHEMCAD into Sunway University's Chemical Engineering Thermodynamics curriculum, replacing the traditional lab sessions. This approach has two main benefits, i.e., it provides early exposure to process simulation software, bridging theory and practice, and it supports new chemical engineering programs where labs may not be fully operational (Kong, Omar, Lau & Sunarso, 2024). There are suggested methods of teaching chemistry subjects in secondary schools with little or no laboratory; hands-on learning using mobile laboratory packages, storytelling, role play, sports-based learning, visual clues, instructional conversations, science text cards, word games, and graphic organisation (Gibbs, 2020).

Quality assurance policies in education are designed to enhance educational standards and ensure that teaching and learning processes meet defined benchmarks. In Uganda, these policies are pivotal in shaping the education landscape, particularly in STEM where subjects such as Chemistry, require specialized teaching-learning facilities and resources. This analysis explores how quality assurance policies can influence Chemistry education in secondary schools in Uganda, focusing on teachers' disposition, compensation, and motivation. The input required in the teaching of science subjects which would allow academic freedom is costly hence both private and government grant-aided secondary schools hardly acquire or access the teaching-learning facilities (Ajuaba, Ssentamu, Cutright, 2023). This requires a new approach to teachers' positive disposition where simulation and other methodological approaches of teaching-learning chemistry would be employed at low secondary schools. The audio-visual facilities including smartphones would be encouraged at a reduced cost subsidized by the Ministry of Education and Sports. The country is

***Corresponding Author: Maate Clive**

focusing on science, technology, engineering and mathematics (STEM) which will enhance innovation and creativity (Maate, 2023). There is an existing challenge when employees' compensation in private secondary schools, private colleges and universities in the country. Over 85% of the university lecturers earn less than US$10,000 annual gross salary, secondary teachers less than US$1500 annual gross salary, and primary schools US$1120 as annual gross salary (Kibalirwandi, 2024; Mbabazi, 2024). The discrepancy with government lecturers earn between US$27200 and 50,239 annual gross salary. The secondary school Arts teachers earn US$202 per month or US$2,431 as annual gross salary. These salary disparities destroy teachers' morale hence collegiality in the education system is being eroded by the government policy toward science education. Although our society and our schools often compartmentalize these developmental processes and treat them as distinct from one another and treat the child as distinct, we synthesize evidence and experience that the sciences of learning and development demonstrate how tightly interrelated they are and how they jointly produce the outcomes for which educators are responsible (Darling, 2020). The excelling of science subjects depends on how best English teachers have taught students as well as non-teaching staff in schools.

The teaching-learning environment could improve students' outcomes in chemistry, with a focus on social justice, equity, and reflective teaching. Social justice is the view that everyone deserves equal economic, political and social rights and opportunities. Social justice is justice about the distribution of wealth, opportunities, and privileges within a society where individuals' rights are recognized and protected (Brown & Haines, 2023). There are several happenings within the country where teachers who were recruited into public service at a diploma level with a salary scale and after upgrading in education to a level of bachelor degree their salary has never been enhanced. This failure to change the salary scale for employees in service based on professional development and growth reduces morale for professional growth. The study was inspired by the ecological system theory of Bronfenbrenner the American Psychologist (Maate, 2023; Hofkitchner & Schafranek, 2011). The explicit presentation of a child's ecological environment to be a complex system with subsystems helps educators understand the connections between teaching-learning environments and secondary school students' academic performance in Chemistry (Maate, 2023; German, 2015). The ecological System theory aims to elaborate on the qualities, rules, and laws that are inherent in all types of "systems, regardless of a particular sort, the nature of the parts, interaction, relations, or "forces" between them. The ecological system theory stresses the five sub-systems that define the child's relationship with his environment; microsystem, exosystem, macrosystem, and chronosystem. In addition, the system is defined as a set of interconnected elements with ordered interactions. According to the systems theory, for learning to occur, teaching and learning facilities and their performance should be controlled appropriately. Therefore, a teaching-learning environment requires teachers of science subjects, arts teachers, and support staff to equally be motivated with commensurate salaries as the ecological system encompasses several organisms and sub-systems. The articles have been organized based on the three objectives below;

Objectives:

1. To analyze the relationship between the availability and quality of teaching-learning facilities and students' academic performance in Chemistry in lower secondary schools.
2. To evaluate how quality assurance policies influence the effectiveness of teaching-learning facilities and the resultant impact on Chemistry education, considering factors such as teacher disposition, compensation, and motivation.
3. To investigate best practices for optimizing teaching-learning environments to improve student outcomes in Chemistry, with a focus on social justice, equity, and reflective teaching practices.

Methodology

A cross-sectional survey design was conducted across respondents over a short period between August 2019 and August 2020 and no follow-ups of the respondents were made for further validation. The process of data collection from the field was done in the third term of 2019 where students and chemistry teachers were the main respondents in February 2020 before the outbreak of Covid-2019. The survey was also preferred because it allows the researcher to get detailed information about the factors influencing the performance of learners in chemistry at the ordinary level in Kasese Municipality, Kasese District-Uganda. A total of 363 participants including 325 participants for quantitative data and 38 participants for qualitative data. The self-administered questionnaire was applied and the interview schedule was significant in the data collection process.

Results and Discussion

The results show that the presence of laboratory staff has a high mean of 3.51, followed by adequate laboratory apparatus with a mean of 3.05, the frequency of practical work in the laboratory has a mean of 3.00, and hands-on practical exercises by students have a mean of 2.90. Lastly, textbooks that are frequently used in class have a mean of 2.27 as shown in the table below.

Table 4.05 shows the effect of Teaching-Learning Facilities on Academic Performance in Chemistry.

Teaching-Learning facilities	DA	NS	A	SA	Mean X	Std. dev't
Reference textbooks are frequently used in class	44.3% N(144)	4.9% N(16)	30.2% N(98)	20.6% N(67)	2.27	1.225
Practical work is frequently used in science laboratories	19.7% N(64)	7.7% N(25)	25.5% N(83)	47.1%	3.00	1.157
The school has a laboratory assistant who helps in preparing practical lessons	3.4% N(11)	5.8% N(19)	27.1% N(88)	63.7% N(207)	3.51	.756
The school has adequate lab apparatus for chemistry	18.2% N(59)	7.7% N(25)	25.5% N(83)	48.6% N(158)	3.05	1.136
The Lab apparatus is frequently used by students to demonstrate observation skills	20.6% N(67)	9.5% N(31)	29.5% N(96)	40.3% N(131)	2.90	1.147
Laboratory practical texts books are available to students	58.8% N(191)	9.8% N(32)	18.2% N(59)	13.2% N(43)	1.86	1.132
Pooled mean					2.765	

Source: Maate, 2023

Key: DA means Disagree, NS means Not Sure, A means Agree, SA means Strongly Agree, X=mean, and std. dev't means standard deviation. The participants were N=325, whose responses appear in the table above.

The researcher interviewed one head of the chemistry department, "Why is this being reflected that chemistry teachers do not frequently use chemistry texts books in classes when teaching?" The interviewee responded by saying, "*The reference books that were sent from the Ministry of Education and Sports are never frequently used because some teachers use pamphlets written by teachers from best performing secondary schools in Kampala"*. On probing by one of the heads of the chemistry department, the argument was refuted, *some teachers who part-time in many secondary schools often have less time to concentrate looking for lesson notes from textbooks*. As the researcher further probed, what is the most common pamphlet on the market in ordinary-level chemistry? The interviewee answered, "*Understanding Chemistry for O'Level Uganda Bookshop" where Namutebi Saudah on Jiji. ug free online classified in Uganda today.* These are new products to help schools, teachers and students understand batter and chemistry by Kaweesi Livingston accessible on godsmercybookshop.com.

Reflective teaching requires four lenses of critical reflection: students' eyes, colleagues' perspectives when working together closely as peers, theory, and personal experience to identify and scrutinize the assumptions that shape practice. Reflection in teaching allows teachers to adjust and respond to issues identified during the learning-teaching process. For instance, after mock examination results, teachers review students' results and opt for resource persons and peer teaching. This process may be known as remedial planning where gaps in classroom knowledge and students' understanding are bridged by experts from within the school and others from collaboration.

The researcher further inquired from one of the teachers in charge of SESEMAT to establish why teachers frequently prefer pamphlets to subject reference texts books. The interviewee from an informed point of view argued *that the government has basic textbooks to be used and other authors of pamphlets are simplifying work targeting market and examination knowledge only. But if a student would take time to read through the textbook with their teachers, then would understanding and passing would be possible? However, several teachers do not make references to the authentic textbooks given by the government.*

The empirical evidence shows that libraries are teaching-learning facilities that have not been used effectively by teachers to enhance students' potential for research from textbooks and laboratory experiments. The sub-construct, "Practical work is frequently used in science laboratories" was accepted by 72.6% with a mean of 3.0 and a standard deviation of 1.157. These calculations imply that chemistry teachers present most of their chemistry lessons from science laboratories. This may be the cause why participants claim to be passing chemistry 67.7% of participants agree that their performance in internal examination is always between D1-C6, while 32.3% argue that their performance is between Pass (P7) and F9.

The statement that "The school has adequate lab apparatus for chemistry" in Table 4.05 above was generally accepted by 74.1% with a mean of 3.05 and a standard deviation of 1.136. While inquiring from one chemistry teacher he was able to say *that the government has been giving funds to most private secondary schools under a private partnership policy. These funds are sometimes known as USE capitation grants*" " The researcher was able to find one head teacher who said, "*Government allows head teachers and management to purchase more laboratory equipment from such funds like USE capitation grants. Both private and public secondary schools can use such an opportunity*. However, government-aided secondary schools have received laboratory equipment and textbooks from the Ministry of Education and Sports. The participants further agree that *The Lab apparatus is frequently used by students to demonstrate observation skills* the

general agreement has a mean of 2.90 and a standard deviation of 1.147 as shown in table 4.05 above.

Finally, on this variable participants still argue that laboratory guide textbooks are not adequately owned by the students. Participants who do not agree with the availability of laboratory textbooks were 68.6% with a mean of 1.86 implying that participants are not in agreement with the availability of laboratory textbooks in the schools. The interviewee explained that the practical guide or laboratory text handbook has several practical questions that students can use. The participants argue that,

The teaching-learning facilities contribute a lot to students' academic performance because issues with chemistry require observation and recording. Like preparation of laboratory preparation of hydrogen gas. Students have to be in the laboratory, apparatus, and substances like Zinc granules, Copper (2) Sulphate as a catalyst and Hydrochloric dilute acid must be prepared by the laboratory assistant in time. This variable is fit for this inquiry.

Table 4.07 shows descriptive statistics on teaching methods and performance in chemistry.

Teaching Methods/Strategies	DA	NS	A	SA	X	Std. dev’
Teachers' knowledge and skills are very good in chemistry	12.9% N(42)	5.2% N(17)	26.2% N(85)	55.7% N(181)	3.25	1.034
The class has students who get above 80% in chemistry	39.4% N(128)	18.5% N(60)	23.1% N(75)	19.2% N(62)	2.22	1.159
The effectiveness of teaching chemistry is a result of students' activeness	13.5% N(44)	12.9% N(42)	34.2% N(111)	43.4% N(141)	2.99	1.033
I observe the processes of experiments in laboratories well	14.5% N(47)	9.5% N(31)	32.6% N(106)	43.4% N(141)	3.05	1.053
I write well what I observe during laboratory experiments	13.5% N(45)	8.3% N(27)	35.7% N(116)	42.2% N(137)	3.06	1.029
I participate in small groups discussing chemistry	26.2% N(85)	4.0% N(13)	31.7% N(103)	38.2% N(124)	2.82	1.200

Key rating

DA means Disagree, **NS** means Not Sure, **A** means Agree, **SA** means Strongly Agree, **X**=mean, and **std. dev** means standard deviation

Any mean above 2.5 implies that there is a general agreement signifying that participants agree that teachers' knowledge and skill affect students' academic performance in secondary schools in Kasese Municipality. The interviewee argued that *teaching methods require the teacher to be skilful with scaffolding strategies. When building a mansion will get ladders to help him reach high heights. That stand is a scaffold. The teacher has to look for learning aids like digital teachers.co.ug/a-level-physics-chemistry/teachers' skills and knowledge to help students learn how to observe demonstrations and experiments in chemistry. However, demystifying the fact that chemistry is a hard subject must be handled by chemistry teachers.*

Scaffolding in the teaching of chemistry like any other science is important to enhance understanding and critical thinking among learners. Scaffolding refers to a method when teachers offer a particular kind of support to students as try to learn and develop new concepts or skills. The first strategy requires "show and tell", the second "tap into the prior knowledge", the third, "give time to talk", the fourth, "pre-teach vocabularies", the fifth, "use visual aids", and the sixth is to "pause, ask questions, pause and review" (Alber, 2014; Maate, 2023). Questions should be designed early enough that are open-ended not closed questions that will always require Yes/No responses. For instance, experiential learning will require students to be actively engaged through doing and reflecting on activities which empower them in critical thinking and prepare them for future reference. The questions are stated in open-ended style such as How is oxygen prepared in the laboratory? How do confirm that the gas prepared is oxygen? What materials and equipment will a scientist require in the preparation of oxygen in the laboratory? How is oxygen important in the hospital? Why should oxygen be carried in plastic bottles or glassed with close-fitting covers? All these mentioned open-ended questions require critical thinking (Maate, 2023).

Table 4.09: Linear Regression showing Teaching-Learning Facilities and Students' Academic Performance in Chemistry.

Bayes factors model summary					
Bayes factor [c]	R	R^2	Adjusted R	Std. the error in estimation	Significance
4.734	0.781	0.610	0.448	0.37	0.001
a.method: jzs					
c. Bayes factor: Testing model versus null model (intercept)					

Source: Maate, 2023

b. Model: (Intercept), My gender is , My Score in PLE Mathematics was, My PLE results in Science was , My English Results in PLE were as, My Career Aspiration is to become , I enjoy chemistry, Chemistry is a hard subject, Reference text books are frequently used in class, Practical work is frequently used in science laboratories, The school has laboratory assistant who helps in preparing practical lessons, The school has adequate lab apparatus for chemistry , The Lab apparatus are used frequently used by students to demonstrate observation skills , Laboratory practical texts books are available to students , Teachers personal knowledge and skills is very good in chemistry, The class has students who get above 80% in chemistry, Effectiveness of teaching chemistry is a result of students activeness , I observe the processes of experiments in laboratories well, I write well what I observe during laboratory experiments, I participate in small groups discussing chemistry, The chemistry teacher builds on our previous knowledge when teaching, The chemistry teacher allows students talk during teaching-learning process, The teacher pre-teach new vocabularies before teaching content with hard chemistry vocabularies, The teacher uses pictures, charts, symbols, to mention but a few. To explain concepts in chemistry, the Teacher reviews previous examinations and tests before giving new examinations, Chemistry teachers are available for consultation outside classroom teaching

It is believed that not having a fully flagged science laboratory for chemistry is not much handicap for the introduction of chemistry principles (Maate, 2023). The presence of active laboratory assistants and chemistry teachers is significantly important. Teaching-learning facilities in chemistry include all those resources planned by the chemistry school department to enhance the teaching-learning process of chemistry subjects for the purpose of student's academic performance in chemistry. However, there is a need to emphasize policy reform in education from secondary schools and universities in the country as STEM is being emphasized globally to increase sustainability in terms of ending poverty, hunger, poor health, solving climate threats, and gender inequality.

Discussion

The findings of the study and existing literature show that teaching-learning facilities go beyond textbooks, laboratory apparatus, chemicals, and computers. This involves the combination of resources both human and physical resources that includes financial resources to purchase what is not locally available in the school environment like chemicals and apparatuses. The human resources include science teachers, laboratory technicians and laboratory assistants who support the preparation of experiments and maintain the security of laboratory equipment. The compensation of employees in terms of salary and allowances has been an issue of contention when it comes to private secondary schools and teachers not on government payroll where annual gross income is not sufficient to meet daily living expenses for teachers in secondary schools. Physical facilities provide students with an adequate atmosphere conducive to learning. Modern physical facilities are important and have positive effects on students learning and performance (Yangamba, 2023).

While discussing the academic performance of students in chemistry and any other science subjects, it is important to consider the ecological systems theory which emphasizes that the learning environment starts from a micro-sub-system to a macro-sub-system in the ecological environment that has families, surrounding environment and other organisms. The well-being of ecological members leads to the successful living of several ecological organisms.

The relationship between the availability and quality of teaching-learning facilities and students' academic performance in Chemistry in lower secondary schools.

The results show how important are teaching-learning facilities to enhance chemistry subject and other science subject when the learning environment is carefully planned. As supported by the World Bank, "The planning of good learning spaces is a discipline that combines different sciences and that requires the involvement of all users of these spaces—teachers, parents, and children—in the decision-making process for infrastructure development. Policymakers could do more to include these groups in the envisioning, coordination, and planning of specific infrastructure projects (Barrett et al 2019)". There is a lack of sufficient support for science subjects as government policy has shown a lot of gaps starting from funding sources, USE/UPE policy implementation deficits, lack of poverty alleviations to enhance family and household income, national wide corruption, as it has been the case in other African countries (Enyiazu, 2022). The policy should be established for the minimum standards of establishing secondary schools and minimum qualification of teachers and salaries to create enthusiastic teachers with positive disposition to handle chemistry and other science subjects in collaboration with other subjects like English and economics. Corruption in the country can be controlled by accountants who are not recognized as scientists hence scholars who are not pure scientists can determine the level of economic recovery and progress in schools as well as national development (Darling, 2020).

Professional dispositions include the values, commitments and ethics that influence behaviours toward students, families,

colleagues and communities that affect student learning, motivation and development, as well as the educator's professional growth. Positive dispositions are prepared, to set transparent and fair expectations acquired by a teacher while still in universities and other tertiary institutions where he/she is trained to become a professional teacher. Professional disposition is acquired skill, habit, preparation, a state of readiness or a tendency to act in a specified way. Someone's disposition is their mood or general attitude about life or the future. The teachers must be informed about brain plasticity which emphasises that the human brain can be modelled to do something correct under guidance. Learning is possible provided stimuli and incentives are given. These teachers develop positive attitudes they are patient with students during teaching and assess their teaching regularly to enhance academic performance in chemistry and other basic science subjects. They can adjust their teaching strategies to fit the students and the material, recognizing that different students learn differently. They employ scaffolding facilities that enable students to develop chemistry skills; observation, measurement, recording and inference or critical thinking skills.

Quality assurance policies often emphasize the importance of professional development and continuous improvement. In Chemistry education, these policies can affect teachers' disposition by promoting a culture of reflective teaching and lifelong learning. When policies mandate regular training and professional growth opportunities, Chemistry teachers are better equipped with updated knowledge and pedagogical skills. This fosters a positive disposition towards teaching, encouraging teachers to engage more effectively with students, adopt innovative teaching methods, and create an environment conducive to learning.

Compensation is a critical factor influencing teachers' motivation and performance. Motivation of teachers increases morale to accomplish tasks assigned to enhance students' academic performance. Quality assurance policies that include provisions for fair remuneration and recognition of teachers' efforts can significantly impact Chemistry instruction (Kibalirwandi, 2024). Adequate compensation not only helps retain qualified teachers but also motivates them hence increasing morale to put in extra effort (Tamwanzire, 2024). In Uganda, where resources may be limited, quality assurance policies that advocate for improved salaries and benefits can lead to enhanced job satisfaction among Chemistry teachers. This, in turn, translates to better teaching practices and improved student outcomes in Chemistry. Furthermore, quality assurance policies that incorporate performance-based incentives can further boost teachers' motivation. By linking compensation to performance metrics such as student achievement and innovative teaching practices, these policies create a sense of accountability and encourage teachers to strive for excellence in their Chemistry teaching.

Quality assurance policies influence the effectiveness of teaching-learning facilities and the resultant impact on Chemistry education, considering factors such as teacher disposition, compensation, and motivation.

Quality assurance policies that mandate regular professional development contribute to teachers' expertise in Chemistry. This includes access to updated teaching resources, modern laboratory techniques, and new pedagogical approaches. As a result, Chemistry teachers can deliver more effective and engaging lessons, improving students' understanding and performance in the subject. Effective quality assurance policies often require the provision of adequate teaching resources and facilities. In the context of Chemistry education, this includes well-equipped laboratories, up-to-date textbooks, and digital tools. Policies that ensure the availability of these resources enable teachers to conduct practical experiments and demonstrations, which are crucial for comprehending complex chemical concepts. Teachers who are motivated and supported by quality assurance policies are more likely to create stimulating and interactive learning environments. This increased engagement can enhance students' interest in Chemistry, leading to better academic performance. Motivated teachers are also more inclined to employ diverse teaching strategies and seek innovative ways to make Chemistry relatable and interesting for students.

Best practices for optimizing teaching-learning environments to improve student outcomes in Chemistry, with a focus on social justice, equity, and reflective teaching practices.

Optimizing teaching-learning environments in Chemistry requires a multifaceted approach that addresses not only pedagogical practices but also broader issues of social justice and equity (Brown & Haines, 2023). This is especially critical in contexts where disparities in teacher compensation exist between government and private secondary schools where science teachers are paid a monthly salary between 3,000,000 to 4,000,000 (US$800 to US$1067) as compared to teachers not on government payroll who earn between 250,000 to 470,000 (US$67 to US$125) per month. As that are not enough science teaching facilities like laboratory apparatus, and chemicals are expensive where private schools with private means can hardly succeed in acquiring instructional materials more private schools contribute to 50% of the total enrollment in Uganda. Implementing best practices in such environments can help ensure that all students, regardless of their school type, receive high-quality Chemistry education (Mbabazi, 2024).

Standardize Resources where students and teachers are capable of accessing resources based on government support to enhance science subjects is desirable and important. The government would ensure that all schools, regardless of their funding sources, have access to essential Chemistry teaching resources such as well-equipped laboratories, current textbooks, and digital tools. This can be achieved through government initiatives or public-private partnerships. Secondly, resource sharing would be promoted where facilitating resource-sharing programs where private schools can collaborate with government schools to access high-quality teaching materials and equipment.

Professional Development and Reflective Practice organized under SASMAT in secondary school would be emphasized for both private and government secondary schools in the country. That is ongoing SASMAT training to implement continuous professional development programs for Chemistry teachers that focus on reflective teaching practices. Training should include innovative teaching methods, new scientific discoveries, and effective ways to address diverse learning needs. Also, it is important to develop "reflective teaching" where teachers are encouraged to engage in reflective practice by regularly evaluating their teaching strategies and student outcomes. This could involve peer observations, self-assessment, and feedback from students and colleagues.

Despite the souring salary disparities in the country, where members of parliament constantly keep increasing their salaries, science teachers in secondary are being paid more than any employees in education without considering science teachers in primary schools. A fair compensation framework is desirable for teachers. There is a need to advocate for a more equitable salary structure that addresses the disparity between government and private school teachers. Develop a framework that allows for fair compensation based on qualifications, experience, and performance, regardless of the school type (Brown & Haines, 2023).

Incentives for Private Schools and proprietors of private secondary schools where science subjects are well performed due to capital investment should be enhanced. Provide financial incentives or subsidies to private schools that can help them offer competitive salaries to their science teachers. This will help attract and retain qualified Chemistry teachers in private institutions. There is a need to design chemistry curricula that are inclusive and reflect diverse perspectives. For instance, applied chemistry and pure chemistry ensure that all students have the opportunity to engage with chemistry concepts in a way that is relevant to their cultural and socio-economic backgrounds. Applied chemistry is the scientific field for understanding the basic chemical properties of materials and for the production of new materials with well-controlled functions. This will help for the implementation of support systems for students from underprivileged backgrounds, including after-school tutoring, mentorship programs, and access to additional learning resources to enhance competence-based curriculum in both primary and secondary schools. The incentives may help to bridge the gap between students from different socio-economic backgrounds.

Increasing “Teacher Networks" through access to SASMAT training courses and workshops creates networks and forums where chemistry teachers from various schools (government and private) can collaborate, share best practices, and discuss challenges. This will help in the dissemination of effective teaching strategies and mutual support. Additional community involvement where members of the Parents Teachers Association (PTA) will expiate engage with the local community to support chemistry education. The community-based initiatives can include science fairs, guest lectures, and partnerships with local industries to enhance students' learning experiences.

Finally, regular assessments as part of the solution to enhance students’ academic performance in chemistry in low secondary schools should be encouraged. Conducting regular assessments of the teaching-learning environment and student performance in chemistry is crucial for national development. The data collected from the field may be used to identify areas for improvement and to measure the effectiveness of implemented practices. The feedback mechanisms with the government ministry are extremely poor when it comes to the assessment of science subjects and national targets for education. Establish feedback mechanisms where students, parents, and teachers can provide input on the effectiveness of chemistry teaching and resources. The projects and exposition can easily provide the best feedback to make informed adjustments and improvements.

Conclusions

There is an existing relationship between teaching-learning facilities and students’ academic performance in chemistry where the pooled mean of 2.765 signifies a strong agreement. The teaching-learning facilities require the presence of human resources such as chemistry teachers, laboratory assistants and technicians to assist learners in having hands-on experience and chemistry skills of observation, measurement, recording and explanation hence increasing decision-making in problem-solving. This may increase competence-based curriculum implementation where applied chemistry will be available for students to use in daily life applications.

Quality assurance policies in education play a crucial role in shaping the teaching-learning dynamics of Chemistry in secondary schools in Uganda. By focusing on teachers' disposition, compensation, and motivation, these policies help create a supportive and resourceful environment for effective Chemistry instruction (Smith, 2021). Ensuring that teachers are well-supported and fairly compensated not only enhances their teaching practices but also contributes to improved student outcomes in Chemistry. Therefore, implementing and refining quality assurance policies is essential for fostering a high-quality Chemistry education system in Uganda.

Optimizing the teaching-learning environment for Chemistry requires a holistic approach that balances resource allocation, professional development, and equitable compensation. Addressing salary disparities between government and private schools, promoting reflective teaching practices, and ensuring social justice and equity in education are crucial for improving student outcomes. By implementing these best practices, we can create an environment where all students, regardless of their school's funding source, have the opportunity to excel in Chemistry and achieve their full potential.

Recommendations

- The government should work with both private and government-aided secondary schools to enhance students' performance in chemistry and other science subjects by emphasizing a new approach to increasing teachers’ disposition while still in universities and other tertiary institutions.
- The government should provide means to fund resource acquisitions for both government and private secondary schools since 50% of schools enrolled are served by private schools.
- Labour law to enhance teacher's salaries should be established to bridge the wide gap between salaries to the labour force in the country. This will be able to regularity the establishment of education facilities that cannot serve and provide quality education to the citizens.

Acknowledgement

The authors would like to appreciate researchers whose scholarly articles, theses, and books have been consulted. They would like to thank secondary schools, teachers and students in Kasese Municipality who actively participated in the study.

References

1. Okebukola, P. A & Uvaliac, S., (2019). Quality assurance in Higher Education Across the world. UNESCO.
2. Yangambi, M. (2023). Impact of school infrastructures on students learning and performance: case of three public schools in a developing country. *Creative Education*, *14*(4), 788-809.
3. Enyiazu, F. A. (2022). The problems of educational policy implementation and its influence on the welfare of teacher labor market in Nigeria. *Open Access Library Journal*, *9*(8), 1-22. https://doi.org/10.4236/oalib.1108868
4. Mbabazi, A., (2024). Performance Appraisal, Motivation and Teachers' Job Output in Secondary Schools in Uganda: A Case of Kasese District. Doctoral Draft thesis. Kampala International University.
5. Gibbs, G. (2018). Learning and Teaching in Higher Education. Open University Press.
6. Darling-Hammond, L. (2020). *Teaching as the Learning Profession: Handbook of Policy and Practice*. Jossey-Bass.
7. Smith, J. (2021). Teacher Motivation and Morale: The Impact of Compensation and Working Conditions. Journal of Educational Psychology, 113(4), 665-677.
8. Brown, C., & Haines, M. (2023). Social Justice and Equity in Education: A Practical Guide. Routledge.
9. Maate, C., (2023). Teaching-Learning Facilities and Students' Performance in Chemistry in Selected Secondary Schools in Kasese Municipality. Doctoral Thesis of Mbarara University of Science and Technology.
10. Kibalirwandi, M. M., (2024). An Evaluation of Staff Participation in Quality Assurance Implementation in Ugandan Universities. Doctoral Draft Thesis of Mbarara University of Science and Technology.
11. Vo, T.T.D.; Tuliao, K.V.; Chen, C.-W. Work Motivation: The Roles of Individual Needs and Social Conditions. Behav. Sci. 2022, 12, 49. https://doi.org/10.3390/bs12020049