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Factors that constrain Science Teachers on Using Teaching and Learning Support Materials in Grade 11 Chemistry and Physics Classes

***Andreas Muronga Shifafure[1], Haufiku Isidor[1], & Angelius Kanyanga Liveve[1]**

[1]The International University of Management, Windhoek, Namibia

*Author correspondence: a.shifafure@ium.edu.na

ABSTRACT

The study investigated the factors that constraints Chemistry and Physics teachers from using different Teaching and Learning Support Materials (TLSMs) for effective teaching of Grade 11 Chemistry and Physics in Kavango East Region, Namibia**.** Following the mixed method research design, closed-ended questionnaires, interviews, and live classroom observations were used to collect data from all the twenty-one Chemistry and Physics teachers and one Science Education Officer in the region. Thus, the participants were purposively selected. Descriptive statistics was used to analyse the quantitative data while the qualitative data was analysed thematically. Findings from the study revealed that the following factors constrained the teachers from using TLSMs for effective teaching of Grade 11 Chemistry and Physics contents: teachers' lack of pedagogical knowledge in using TLSMs, scarcity of TLSMs, overcrowded classrooms, poor English as a Second language, lack of well-equipped school laboratories, and lack of training workshops. Therefore, the following recommendations were put forward: teachers should incorporate more practical laboratory activities with the lesson in some of the topics to expose learners to experimental techniques and handling of apparatus, SEO should convene workshops more regularly based on innovative usage of TLSMs, SEO should organize school visits to see how teachers are teaching using TLSMs and Regional Office and Ministry of Education Arts and Culture should provide adequate relevant TLSMs as well as equip Chemistry and Physics school laboratories in school to avail teachers the needed TLSMs for effective teaching of Chemistry and Physics in the study area.

Keywords: Keywords: Chemistry, Effective teaching, Physics, Laboratory, TLSMs

1. INTRODUCTION

The main goal of this study was to investigate the factors that constrain Chemistry and Physics teachers from using different Teaching and Learning Support Materials (TLSMs) for effective teaching of Grade 11 Chemistry and Physics in Kavango East Region, Namibia. The National Curriculum for Basic Education (NCBE), (2016) outlined that effective learning and teaching are closely linked to the effective use of teaching and learning materials (for example, books, posters, charts, and recycled waste materials) and ICTs (for example, computers as well as audio and visual media) in the classroom. Therefore, the teacher must select and develop the most appropriate materials and media to support teaching and enhance learning. However, teachers face some constraints during the usage of these TLSMs in order to effectively teach the contents of Grade 11 Chemistry and Physics. As emphasized in the new curriculum for the Namibian Senior Secondary Certificate Ordinary Level (NSSCO) Chemistry and Physics (2018), scientific skills and knowledge acquisition require advanced technology through the efficient and effective use of TLSMs and processes.

2. LITERATURE REVIEW

One of the major constraints experienced by Grade 11 Chemistry and Physics teachers in Namibia is the scarcity of equipment, materials and science laboratory in schools. According to a study conducted in Namibia by Stanley (2014) secondary school laboratories are poorly equipped with necessary materials for teaching of Chemistry and Physics which negatively impacts teaching using TLSMs. In the same vein, Nakanyala (2015) added that secondary school laboratories are poorly equipped with necessary materials for teaching Chemistry and Physics which negatively impacts teaching using TLSMs. For instance, lack of adequate ICT equipment, laboratory apparatus and internet access are some of the key problems that schools specifically in rural areas are facing now (Chapelle, 2017). Moreover, a study conducted in Ghana by Adu-Gyamfi (2014), the science materials and equipment were said to be unavailable and where they were available, they were insufficient for effective and efficient science teaching and learning. The results of research conducted in Kenya revealed that though some schools have been provided with computers, most are limited to one computer which is used for the office administration purposes only (Chapelle, 2017). Additionally, Umugiraneza et al. (2018), presentation is another heart of the teaching process, and the best way of getting students excited in Chemistry and Physics is by allowing them to touch and use the materials through guidance and supervision. They added that science teachers should be trained on the usage of TLSMs in order to use a variety combination of teaching methods with materials to be used by both learners and teachers like boards and audio-visual aids resources such as test-tube, ammeter, voltmeter and practical videos. The report of research conducted in Malaysia–showed that the overall key issues and challenges found to be significant in using TLSMs by Physical Science teachers are lack of effective pre-service and in-service Chemistry and Physics teachers training on usage of science apparatus and materials in most secondary schools (Edumadze, 2015).

3. RESEARCH METHODOLOGY/MATERIALS AND METHODS

This study used the sequential explanatory mixed methods design where the quantitative phase was conducted first and followed by the qualitative phase. This research approach provided some significant opportunities for us to gain a deeper understanding on the factors that constrain teachers from using different TLSMs for effective teaching of Grade 11 Chemistry and Physics in Kavango East Region, Namibia. The maximum purposive sampling technique was used to select all the 21 Grade 11 Chemistry and Physics teachers currently teaching in Senior Secondary Schools, and one Science Education Officer (SEO) in the Kavango East Region. Thus, the study sample consisted of 22 participants. All the 22 participants were identified with pseudonyms, and

they completed the questionnaires after which a sub-sample of (ten) 10 Chemistry and Physics teachers, and the one (1) SEO were purposively selected to participate in the follow up interviews and classroom observations. We used closed-ended survey questionnaires, face-face interviews and classroom observation to collect data on the factors that constrain teachers when using TLSMs and face-to-face interview to collect data on the research problem. The questionnaires were designed based on four-point Likert scale (A-Agree, SA-Strongly Agree, D-Disagree and SD-Strongly Disagree) to survey the factors that constrain Chemistry and Physics teachers from using different TLSMs for effective teaching of Grade 11 Chemistry and Physics. Additionally, live classroom observations were carried in 10 different classes to personally capture the factors that constrain Chemistry and Physics teachers from using different TLSMs for effective teaching of Grade 11 Chemistry and Physics. Teherani et al. (2015) defines observation as the systematic process of recording the behavioural patterns of participants, objects and occurrences without necessarily questioning or communicating with them. The aim of triangulating the data collection using multiple instruments was to assess the factors that constrain Chemistry and Physics teachers from using different TLSMs for effective teaching of Grade 11 Chemistry and Physics in different perspectives, and to assess whether or not, the findings supplement one another.

4. ANALYSIS

Descriptive statistics (percentage and frequency distribution) were used to analyses the quantitative data and then presented in tables. On the other hand, thematic analysis method was used to analyse the qualitative data whereby, the data were grouped into themes that emerged based on the research questions. First, the recorded interviews were transcribed verbatim and coded. According to Teherani, et al. (2015), coding is the process of reading carefully through your transcribed data, line by line, and dividing it into meaningful analytic units, and marking the segment of data with symbols, descriptive words or unique identifying names. Finally, the coded data were organized into themes based on the research questions and discussed in detail.

5. RESULTS AND DISCUSSION

5.1 Factors that constrain Chemistry and Physics teachers from using different TLSMs

5.1.1 Findings from the teachers and SEO questionnaires

Problems experienced by teachers when using TLSMs to teach Grade 11 Chemistry and Physics

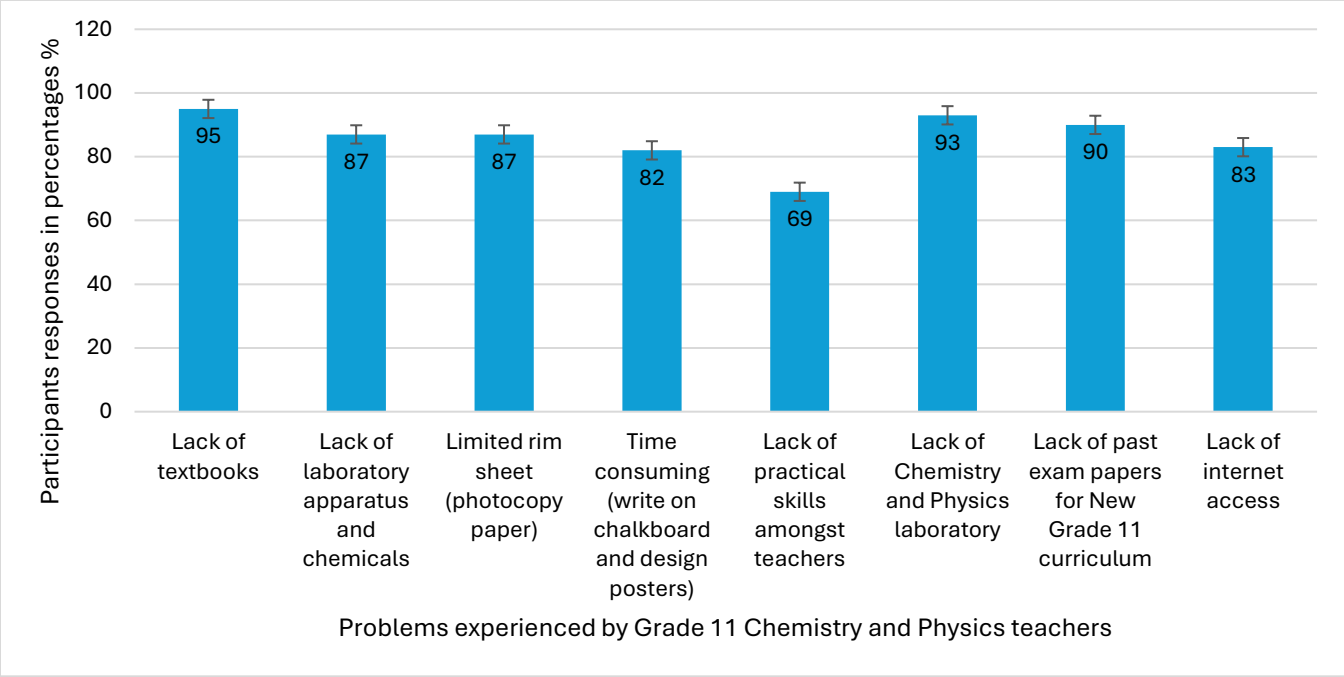


Figure 5.1.1: Problems experienced by teachers when using the TLSMs in teaching of Grade 11 Chemistry and Physics

The findings (Figure 1) revealed that majority of the participants consistently indicated that they have challenges of lack of the following: textbook (95%), laboratory apparatus (87%), photocopy papers (87%), practical skills (69%), Chemistry and Physics laboratories (93%), past exam question papers (90%), lack of internet access (83%), and spent too much time writing on chalkboard (82%). From Figure 1, if the schools lack most of these TLSMs to be used when teaching Chemistry and Physics, it is likely that effective teaching of Grade 11 Chemistry and Physics will not be realised in the study area.

Table 5.1.1: Problems experienced by teachers using teaching and learning support materials in Grade 11 Chemistry and Physics classroom

Statements	**A**	**SA**	**D**	**SD**
Teachers have plenty TLSMs at their schools	-	-	-	√
All our Grade 11 learners have their own Physics and Chemistry textbooks	-	-	√	-
All schools have a well-equipped Physics and Chemistry laboratory.	-	-	-	√
Teachers do not have enough materials for doing practical's	√	-	-	-

The findings in Table 1 indicated that SEO strongly disagreed with the statement that Chemistry and Physics teachers have plenty TLSMs at their schools and disagreed with the statement that all Grade 11 learners in the Kavango East Region have their own Chemistry and Physics

textbooks. Furthermore, the SEO strongly disagreed with the statement that all secondary schools in the Kavango East Region have a well-equipped Chemistry and Physics laboratory. Therefore, the findings revealed that the Chemistry and Physics teachers do not have enough TLSMs for effective teaching of these subjects in the study area. In a different study, Stanley's (2014) maintained that effective teaching is constrained in the schools where there are inadequate facilities. Similarly, Royea and Nicol (2019), posit that for effective teaching to prevail, teachers should use TLSMs to help facilitate effective teaching of science subjects as the TLSMs help to gain learners' attention and maintain their interest so that they can acquire and master the appropriate skills. In a different study, Yilmaz (2021) pointed out that lack of using instructional materials and practical lessons in secondary schools was very much related to insufficient skills and creativity among the teachers.

5.1.2 Teachers subject knowledge (TSK) when using TLSMs for effective teaching of Grade 11 Chemistry and Physics.

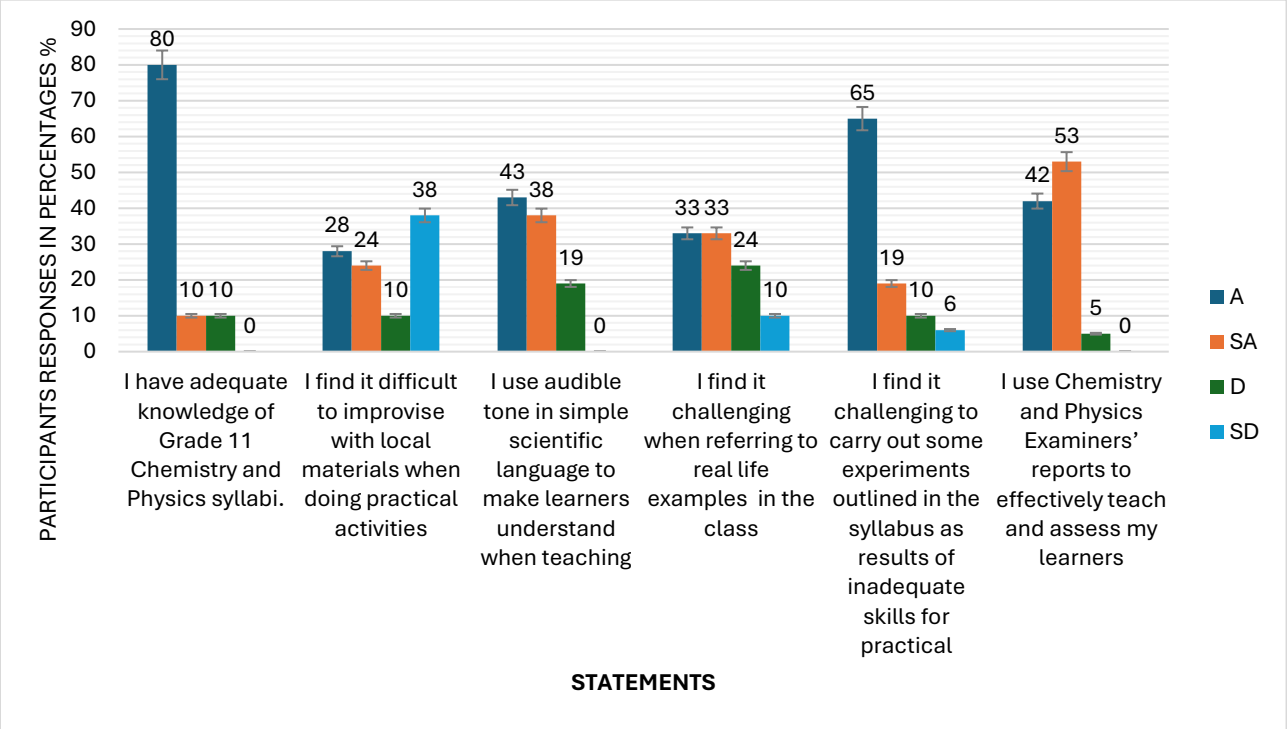


Figure 5.1.2: Teachers' subject knowledge when using TLSMs for effective teaching of Grade 11 Chemistry and Physics.

Figure 2 indicates that the majority of the participants (Chemistry and Physics teachers) agreed that they have adequate subject content knowledge (80%), teach with audible tone (38%), and strongly agreed (53%) that they use Chemistry and Physics Examiners' report to teach their learners effectively. Unfortunately, some participants agreed (28%) and strongly agreed (22%) that they find it difficult to improvise when they are doing practical activities while 33% agreed and strongly agreed that they find it challenging to provide real life examples in class. These results imply that most of the participants have challenges in improvising on local materials and in giving real examples of concepts being taught using TLSMs to link science to the background knowledge of the learners. Thus, there is a need for the teachers to be provided with laboratory apparatus

to eradicate lack of improvisation and to make learners see and use real life examples of apparatus and chemicals in the classroom.

Table 5.1.2: SEO's rating of the Physics and Chemistry teachers' subject knowledge when using TLSMs for effective teaching of Grade 11 Physics and Chemistry

Statements	A	SA	D	SD
Teachers displayed adequate knowledge of Grade 11 Physics and Chemistry when using TLSMs	√	-	-	-
Teachers find it difficult to improvise with local materials when doing practical activities in Physics and Chemistry.	√	-	-	-
Teachers use audible tones in simple scientific language to make learners understand Grade 11 Physics and Chemistry Contents.	√	-	-	-
Teachers sometimes find it challenging when referring to real life materials in some chemistry sections.	-	√	-	-
Teachers find it challenging to carry out some experiments outlined in the syllabus as a result of inadequate skills for practical.	-	√	-	-
Teachers use Physics and Chemistry Examiners reports to effectively teach and assess their learners.	-	√	-	-

The results in Table 3 revealed that the SEO agreed and strongly agreed with the items in the table that suggest that the teachers have some subject knowledge of Grade 11 Chemistry and Physics when using TLSMs during their teachings. Akpan and Kennedy (2020) stated that it is imperative for the subject teachers to have good knowledge of the content they are teaching in order to help learners to understand the subject. For clarification, improvisation means using whatever is available because one does not have what is really needed (Namtwi, 2018). This entails that the Chemistry and Physics teachers should use locally accessible materials to teach the subjects and make the contents more understandable to the learners. Remarkably, Suyanto (2017) supplemented by explaining that through the process of adaptation, the teacher should have the knowledge on how to improvise by personalizing the text in the textbook, making it a better teaching resource and individualizes it for a particular group of learners.

5.1.3 Challenges of teaching Grade 11 Chemistry and Physics curriculum using the available TLSMs

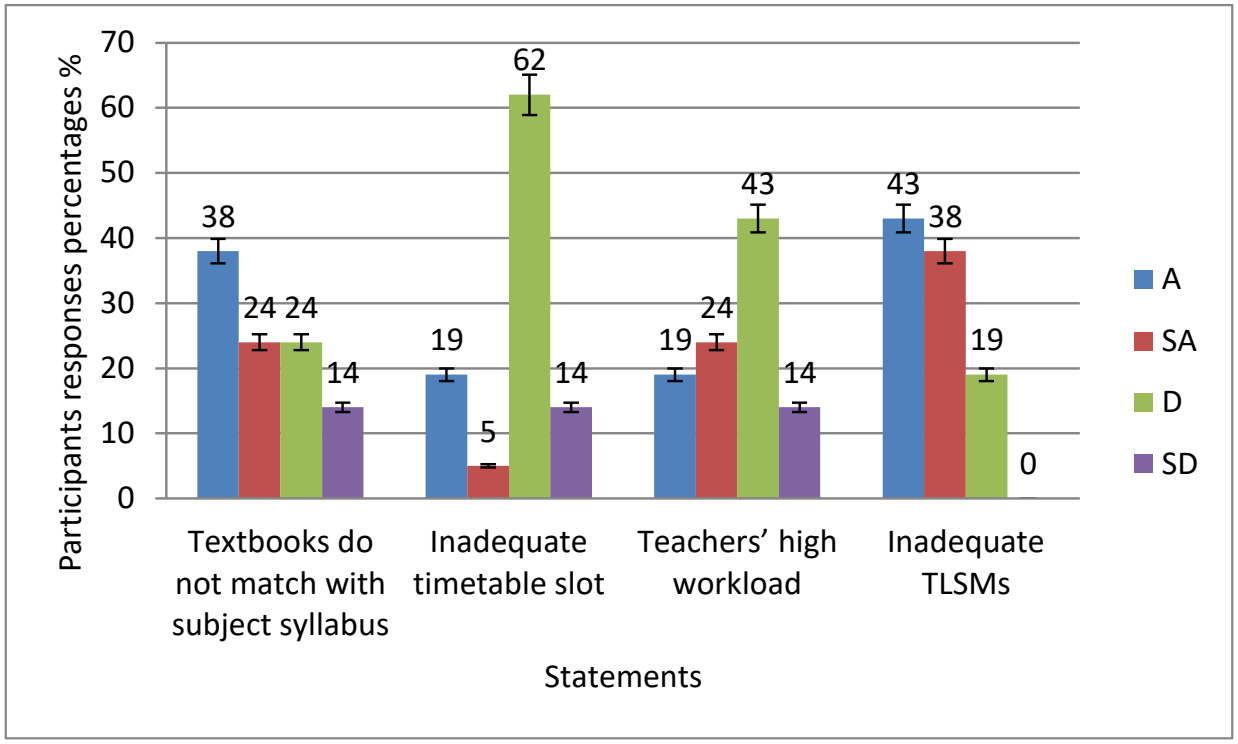


Figure 5.1.3: Challenges of teaching Grade 11 Chemistry and Physics curriculum using the available TLSMs.

The results showed that majority of the participants (38%) agreed that Grade 11 Chemistry and Physics syllabi do not match with some textbooks supplied to their schools. This has a serious implication for effective teaching and learning outcomes as teachers will find it difficult to teach these subjects using the available textbooks as TLSMs. However, the results showed that the required timetable slots were not a challenge for the teachers as 62% of the participants disagreed and 6% of them strongly disagreed with the statement. Despite 19% of the participants agreeing and 24% of them strongly agreeing that they have of teachers' high workload in their schools, the majority (43%) disagreed and 14% of them strongly disagreed that they are overloaded with their works. The findings also showed that majority of the participants agreed (43%) and strongly agreed (38%) that TLSMs specified in the Grade 11 Chemistry and Physics curriculum are not provided at their schools. These results indicated that the teachers faced different challenges when teaching Grade 11 Chemistry and Physics using TLSMs in the study area.

Table 5.1.3: SEO's responses on the teachers' challenges of teaching Grade 11 Chemistry and Physics curriculum using TLSMs

Statements	**Participants responses in percentages / %**			
	A	SA	D	SD
Grade 11 Chemistry and Physics syllabi do not match with some textbooks supplied to schools.	-	-	-	√
Required period in the syllabus and policy of Grade 11 Chemistry and Physics is not reflecting on the teachers' timetable.	√	-	-	-

Inadequate number of Chemistry and Physics teachers at schools to effectively teach the curriculum.	-	√	-	-
Teachers are overloaded with Grade 11 Chemistry and Physics lessons per cycle.	-	-	√	-
TLSMs are specified in the Grade 11 Chemistry and Physics curriculum is not supplied to schools.	-	-	√	-

The findings showed that the SEO strongly disagreed that Grade 11 Chemistry and Physics syllabi do not match with some textbooks supplied to schools. Furthermore, the SEO agreed with the statement that the required period in the syllabus and policy of Grade 11 Chemistry and Physics is not reflecting on the teachers' timetable. Table 4 further showed that the SEO strongly agreed with the statement of inadequate number of Chemistry and Physics teachers at schools to effectively teach the curriculum. However, the SEO disagreed with the statement that the teachers are overloaded with their work. The SEO also disagreed with the statement that TLSMs specified in the Grade 11 Chemistry and Physics curriculum are not supplied to schools. Some of these contradicted the responses provided by the teachers on the same issues in the preceding section. The results correspond with report from the study conducted in Ghana by Adu-Gyamfi (2014), which revealed that science materials and equipment were scarce in schools and where they were available; they were insufficient for effective science teaching and learning. Moreover, the teacher-learner ratio in secondary schools in Namibia is 1:35 (Education Management Information System, 2016). The results of the study are consistent with the results of the studies by Davila (2019) in which the authors revealed that teaching in an overcrowded classroom is stressful, and disheartening. In the same vein, Venketsamy (2023) stressed that overcrowded classrooms in schools have sadly become the new normal, noting that a mixture of an increasing population and a decrease in funding has caused class sizes to soar, and it presents challenges that can feel nearly impossible to overcome, even to the most effective teachers. Mårtensson (2019), stressed that learners tend to learn effectively when the teacher can offer one on one instruction or teach a small group of learners.

The teacher's commitments when using TLSMs to teach Grade 11 Chemistry and Physics

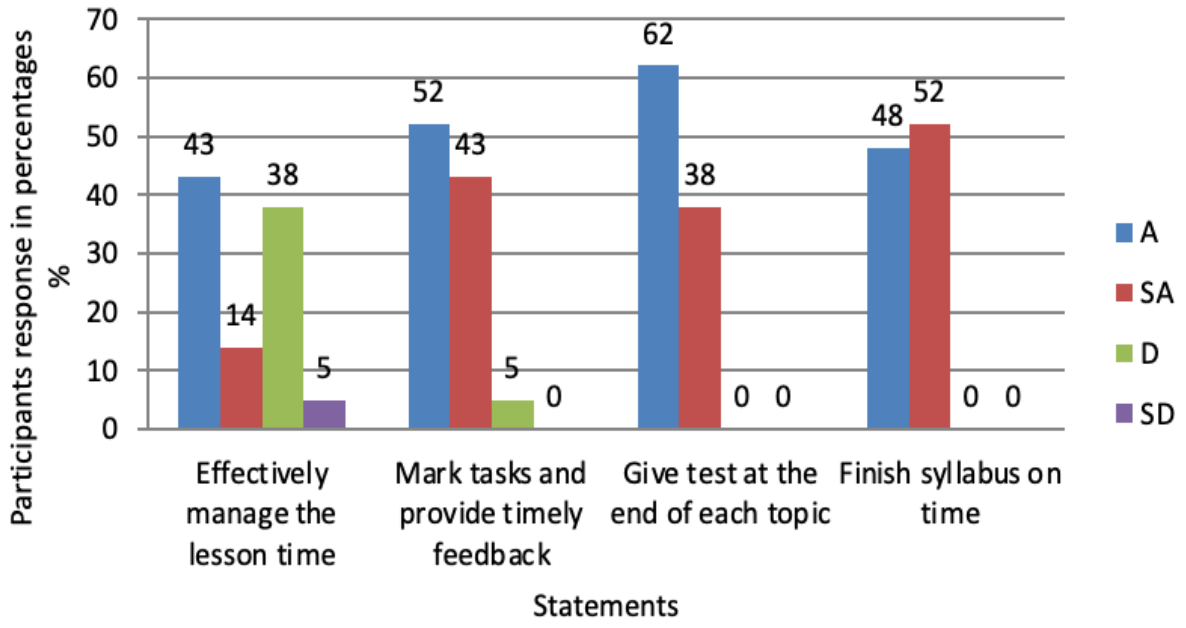


Figure 5.1.4: The teacher's commitments when using TLSMs in their teaching of Grade 11 Chemistry and Physics at school.

The findings (Figure 4) revealed that the participants are committed to their job when using TLSMs in teaching Grade 11 Chemistry and Physics in the study area. The results indicated that majority of the teachers (43%) managed their lesson time effectively and (52%) indicated that they mark all their learners' tasks and give them corrective feedback. Additionally, 62% of the participants indicated that they always give tests at the end of the topic. Furthermore, the findings indicated that 48% of the participants agreed and 52% of them strongly agreed that they always strive to complete the syllabus on time. These results revealed that the teachers are committed to their teaching to achieve effective teaching of Grade 11 Chemistry and Physics.

Table 5.1.4: SEO's responses on teachers' commitments when using TLSMs in their teaching of Grade 11 Chemistry and Physics at schools

Statements	A	SA	D	SD
Teachers manage their lesson time effectively whenever doing practical activities.	-	-	√	-
Teachers mark all the topic tasks they give to their learners and provide corrective feedback clearly on the chalkboard.	-	-	-	√
Teachers always give a test at the end of each in Grade 11 Physics and Chemistry.	-	-	√	-
Teachers always strive to finish their Physics and Chemistry syllabus on time.	-	-	√	-

However, as seen in Table 5, the SEO's responses on the same issues contradicted the teachers' responses. The findings in Table 5 indicate that the SEO disagreed with the statement that the teachers managed their lesson time effectively. In addition, the SEO strongly disagreed with the

statement that the teachers mark all the tasks they give to their learners and provide timely corrective feedback. Furthermore, the SEO disagreed with the statements that teachers always give a test at the end of each topic and teachers always finish their Chemistry and Physics syllabus on time.

5.2 Findings from the Chemistry and Physics teachers and SEO Interviews

5.2.1 Scarcity of TLSMs for Grade 11 Chemistry and Physics

During the interview, the participants highlighted that scarcity of TLSMs was one of the factors hindering Chemistry and Physics teachers from using TLSMs for effective teaching of Grade 11 Chemistry and Physics. The excerpts from some of the interviews were presented. Teacher F1 highlighted that: "*the scarcity of teaching and learning materials in Chemistry and Physics subjects is very challenging, we do not have any teaching materials to teach practical as suggested in the syllabus and prescribe textbooks.* Furthermore, Teacher M1 remarked: "*there is scarcity of the TLSMs in our region as a whole".* The SEO highlighted that: "*most teachers are unable to conduct experiment because they don't have equipment or materials to use".* The results correspond with report from the study conducted in Ghana by Adu-Gyamfi (2014), it revealed that science materials and equipment were scarce in schools and where they were available; they were insufficient for effective science teaching and learning. According to Eksi (2014), schools should be provided with TLSMs for teachers to use these materials and tools during science teaching to attract the attention of the students and increase the effectiveness and efficiency in science education.

5.2.2 Overcrowded Grade 11 Chemistry and Physics classrooms and practical teaching

During the interview, both the teachers and SEO identified overcrowded classrooms as one of the factors affecting the teachers' uses of TLSMs for effective teaching of Grade 11 Chemistry and Physics in the Kavango East Region, Namibia, and the participants consistently stressed how this affected practical teaching. Teacher H1 mentioned that: "*Our classes are overcrowded; these big numbers of learners even make it impossible for teaching practical activities as materials are not enough".* The SEO also maintained that: "*some schools are overcrowded to the point that teachers are unable to conduct the experiment involving all the learners with the already little resources available".* The findings from both the teachers and SEO clearly revealed that the overcrowding of classes was one of the factors which constrained Chemistry and Physics teachers from using TLSMs to effectively teach the subjects in the study area. Contextually, the teacher-learner ratio in secondary schools in Namibia is 1:35 (Education Management Information System, 2016). The results of the study are consistent with the results of the studies by Davila (2019) in which the authors revealed that teaching in an overcrowded classroom is stressful, and disheartening.

5.2.3 Learners' poor English Second Language backgrounds

The participants expressed that the learners' inability to communicate fluently in English language also have negative impact on teachers' uses of TLSMs for effective teaching of Grade 11 Chemistry and Physics in Kavango East Region, Namibia. The responses were as follow: according to Teacher F1, *"Due to the English language barrier that we have in some village schools, the learner-centred approach becomes very challenging and a waste of time".* These findings revealed that the poor English Second Language amongst the Grade 11 Chemistry and Physics learners made it difficult for the teachers to teach effectively using TLSMs. These results corroborate the study report by Lebata and Mudau (2014), where it was outlined that in a country

like Namibia, particularly in the northern regions where school teaching and learning support are poor, it becomes problematic for learners to use ESL.

5.2.4 Lack of workshops for Chemistry and Physics teachers on practical and materials usage

During the interview with the teachers and SEO, the lack of workshop on practical use of TLSMs was stressed as one of the challenges affecting teachers' uses of TLSMs for effective teaching of Grade 11 Chemistry and Physics in Kavango East Region, Namibia. During the interview, the participants reported as per the excerpts below:
According to Teacher O1, "*teachers should be exposed to workshops and be trained on how to use TLSMs".* The findings revealed that there are no or few workshops organized for Chemistry and Physics teachers based on the usage of TLSMs in the study area; rather they only attend workshops on curriculum reforms. Based on the social constructivist theory, which guide this current study, social construction of knowledge takes place in various ways and at different locations (Kapur, 2018). Zindi and Sibanda (2023) added that teachers' trainings help teachers to adopt new teaching techniques and methods, and help teachers to change students' learning attitude positively which ultimately improve their academic performance.

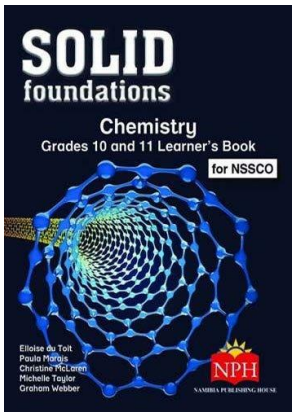
5.2.5 Challenges of using learner-centred teaching method in teaching Grade 11 Chemistry and Physics

The major challenge that the teachers encounter with the use of TLSMs in implementing learner-centred teaching (LCT) method for the effective teaching of Grade 11 Chemistry and Physics in the schools was the scarcity of the relevant materials. During the teacher's interview, majority of the participants seem to recognize the importance of using LCT for effective teaching of Grade 11 Chemistry and Physics but stressed the scarcity of TLSM as their constraint with using this teaching method. As seen in the excerpts from the interview; Teacher F1 remarked: "*the LCT with these few TLSMs will not materialize".* These results were strengthened by Stanley (2014) who noted that if teachers do not use teaching methods that can engage learners to do practical activities, it might decrease their interest in Chemistry and Physics and this could also lead to ineffective use of TLSMs. However, Schleicher (2018), asserts that some of the teachers in Namibian secondary schools tend to use traditional methods of teaching, due to the fact that group work and practical activities are not easy to be used with the insufficient teaching and learning resources.

5.3 Findings from live classroom observations

5.3.1 Availability of TLSMs which teachers use for effective teaching of Grade 11 Chemistry and Physics

The Chemistry and Physics teachers were observed while teaching and the availability of TLSMs which they used during the teaching in their classrooms were noted down. The majority (90%) of the participants observed had very few TLSMs and only 10% of them had several TLSMs for teaching Grade 11 Chemistry and Physics. In all the classes observed, both the Chemistry and Physics teachers, and some of their learners were seen with copies of Chemistry and Physics textbooks. The textbooks used by both the teachers and learners include Namibia College of Open Learning (NAMCOL) and Solid Foundations Chemistry and Physics textbooks (see Figure 5-6 below).



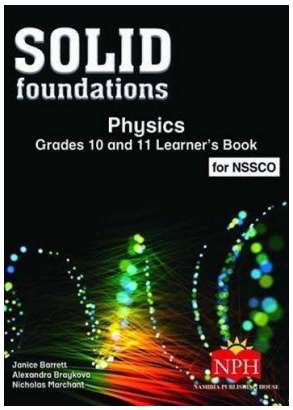
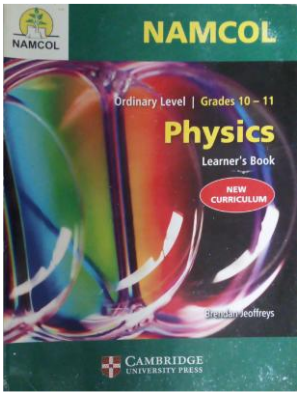


Figure 5.3.1: Chemistry and Physics Textbook: Solid Foundations



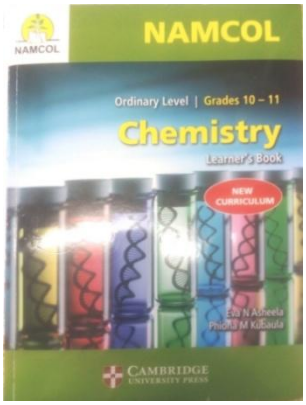


Figure 5.3.2: Physics and Chemistry Textbook NAMCOL

Furthermore, the majority (80%) of the participants do not have well-equipped Chemistry and Physics school laboratories.

Table 5.1.5: TLSMs provided to Physics and Chemistry teachers for effective teaching of the subjects in Kavango East Region

Statement	A	SA	D	SD
Chalkboard	-	√	-	-
Posters	√	-	-	-
Textbooks	-	√	-	-
Charts	√	-	-	-
Recycled materials	√	-	-	-
ICT (Laptops / Desktop computer / internet / Projectors / Overhead Projectors (OHP))	-	-	-	√
Printed media (Handouts)	-	√	-	-
Laboratory Chemicals	√	-	-	-

Videos (You Tube)	√	-	-	-
Laboratory scientific Apparatus	√	-	-	-

The findings from Table 6 indicate that the SEO agreed that the Chemistry and Physics teachers in Kavango East Region are provided with TLSMs like posters, charts, recycled materials, laboratory chemicals, videos (You Tube) and laboratory scientific apparatus for effective teaching of Grade 11 Chemistry and Physics. Moreover, the SEO strongly agreed that chalkboards, textbooks and printed media (handouts) are provided to Chemistry and Physics teachers in the study area. However, SEO strongly disagreed that the teachers are provided with TLSMs (ICT-laptops, desktops and projectors to be used in the newly implemented curriculum of Grade 11 Chemistry and Physics. This might be the case due to the fact that most schools selected in the study do not have ICT facilities. According to Eksi (2014), schools should be provided with TLSMs for teachers to use these materials and tools during science teaching to attract the attention of the students and increase the effectiveness and efficiency in science education. Likewise, the availability of teaching-learning resources is important for effective science teaching to take place in the classroom (Ogunode & Nathan, 2021b).

5.4 Implications for Theory

Ministries of Education must ensure that all schools, especially in rural or under-resourced areas, receive adequate and up-to-date TLSMs. With this, they should develop centralised procurement and distribution systems for science kits, lab equipment, and digital resources. Moreover, Professional Development Mandates for teachers often lack training on how to integrate TLSMs into their lessons. Therefore, ministry of education should implement mandatory, ongoing professional development focused on pedagogical use of TLSMs in science education. Furthermore, infrastructure investment as a result of lack of laboratories, storage, and maintenance facilities limits TLSM usage, ministry should allocate budget for building or upgrading science labs and secure storage spaces in schools. The ministry should strengthen monitoring and valuation systems on areas without accountability, TLSMs may be underused or misused, therefore, establish monitoring frameworks to track TLSM usage and its impact on learning outcomes. Finally, the curriculum alignment on usage of TLSMs must be aligned with curriculum goals to be effective. That, for it to be done, the review and revise of curriculum documents to explicitly integrate TLSMs into learning objectives and assessment criteria should affect.

5.5 Implications for Management, Policy and Practice

In terms of collaborative resource sharing it is likely that teachers in resource-limited schools can benefit from pooling materials. Thereafter, this will eencourage inter-school collaboration and resource-sharing networks. Moreover, lesson planning integration by incorporating usage of TLSMs is often used sporadically or as add-ons. That is why it is vital to train teachers how to embed TLSMs into daily lesson plans and instructional strategies. Continuing, learner-centered learning using TLSMs support active learning but are underutilized. The later results in promoting inquiry-based and hands-on learning approaches using these TLSMs to enhance engagement and understanding. Still, corrective feedback and adaptation for teachers need to reflect on TLSM effectiveness, that is the only way to encourage regular feedback loops and peer reviews to refine TLSM use in classrooms. Finally, digital Literacy for teachers may struggle with using digital TLSMs, but using TLSMs can provide ICT training and access to digital platforms that support science instruction.

5.6 Implications for Future Research

This study was conducted only in secondary schools in the Kavango East Region of Namibia. For that reason, the results of this study may not be inclusive for all the regions in Namibia. Therefore, similar study should be replicated in secondary schools offering Grade 11 Chemistry and Physics across other regions of Namibia to generate country-wide data that can be used to collectively to improve teachers' use of different TLSMs to achieve effective teaching of Chemistry and Physics. This will also further inform the Ministry of Education on policies regarding the provision and the use of TLSMs in secondary schools.

6. CONCLUSION

The main aim of this study was to investigate the factors that constrain Chemistry and Physics teachers from using different TLSMs for effective teaching of Grade 11 Chemistry and Physics in Kavango East Region, Namibia. Therefore, the study revealed that there are a number of factors hindering the Grade 11 Chemistry and Physics teachers from using the TLSMs for effective teaching of Grade 11 Chemistry and Physics in their schools. These included scarcity of TLSMs, insufficient Chemistry and Physics textbook, lack of well-equipped Chemistry and Physics laboratories, lack of pedagogical skills on the use of TLSMs, overcrowding classrooms, learners' poor English Second Language backgrounds, and lack of workshops for Grade 11 Chemistry and Physics teachers on the proper usage of TLSMs for effective teaching of Grade 11 Chemistry and Physics. This is necessary for planning interventions and training programs to equip the teachers with the best methods and practice of improving factors hindering teachers from using TLSMs for effective teaching of Grade 11 Chemistry and Physics in the study area. Therefore, the following recommendations were put forward: teachers should incorporate more practical laboratory activities with the lesson in some of the topics to expose learners to experimental techniques and handling of apparatus, SEO should convene workshops more regularly based on innovative usage of TLSMs, SEO should organize school visits to see how teachers are teaching using TLSMs and Regional Office and Ministry of Education Arts and Culture should provide adequate relevant TLSMs as well as equip Chemistry and Physics school laboratories in school to avail teachers the needed TLSMs for effective teaching of Chemistry and Physics in the study area.

7. ACKNOWLEDGMENTS

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