




The Teaching of Science in Multigrade Primary Schools in Two Rural Districts of Lesotho

Maisaiah Phakisi¹ , Ritu Bhagwandeem² , and Awelani Melvin Rambuda³ 

¹ Lesotho College of Education, Lesotho

² Department of Mathematics, Science and Technology Education, Faculty of Humanities, Central University of Technology, Welkom, South Africa

³ Department of Postgraduate Studies: Education, Central University of Technology, Free State, South Africa

Correspondence: Ritu Bhagwandeem, Department of Mathematics Science and Technology Education, Faculty of Humanities, Central University of Technology, Welkom, South Africa

Email: rgupta@cut.ac.za

Doi: 10.23918/ijsses.v11i3p109

Abstract: Multigrade teaching is common in 46.8% (685 of the 1463) of the primary schools in Lesotho. However, there is a lack of curriculum policies and adequate training to support these teachers even though multigrade teaching prevalence in many educational settings is reported in the literature. A purposively selected sample of 107 teachers from two rural districts of Lesotho filled in the questionnaire, eight classroom observations were conducted and 10 teachers and three district resource teachers participated in the interviews to investigate pedagogical practices employed by multigrade teachers while teaching Science. The outcomes demonstrated a predominance of teacher-centred methods involving chalk and talk, coupled with a quasi-monograde approach where the teacher concentrated on teaching one grade while assigning tasks to other grades, thus considerably reducing teacher contact time. Despite this, certain aspects of successful multigrade teaching such as tiered activities, staggered concept introduction, and peer teaching by senior students were evident. However, these were not fully utilized despite teachers having received orientation Workload, inadequate training, resource shortages, and low motivation were a few identified factors influencing their teaching approaches. Curriculum policy should emphasise multigrade intensive training for teachers in effective activity staggering techniques while this study recommends the creation of self-correcting answer cards for independent activity materials.

Keywords: Multigrade Science Classrooms, Multilevel Teaching, Quasi-Monograde Model, Rigorous Teacher Training, Science Teaching

1. Introduction

According to UNESCO, an estimated one-third of all classes throughout the world/globally are multigrade classes. Multigrade teaching is more common in developing countries, where schools are often small and remote, and teacher resources are limited.

Received: 19.03.2024

Accepted: 17.11.2024

Phakisi, M., Bhagwandeem, R., & Rambuda, A. M. (2024). The Teaching of Science in Multigrade Primary Schools in Two Rural Districts of Lesotho. *International Journal of Social Sciences & Educational Studies*, 11(3), 109-130.

It is also used in some developed countries, such as Finland, where it is seen to promote individualized learning and social cohesion. In 2010, the World Declaration on Multigrade Education was adopted by UNESCO member states, which recognized multigrade teaching as a legitimate and effective approach to education. The declaration also called for governments and international organizations to support multigrade schools and teachers. Despite its prevalence, multigrade teaching often faces challenges. Multigrade teachers must be able to differentiate instruction and meet the needs of students of different ages and abilities (South Africa Department of Basic Education [DBE], 2020).

Multigrade teaching is considered a viable option in many sub-Saharan African countries dominated by low population density, including Lesotho. Lesotho's mountainous terrain makes travelling from one rural area to another difficult. It is dominated by rural communities who remain disadvantaged as compared to their counterparts in urban areas. The population distribution in rural communities tends to be scattered, leading to smaller schools in mountainous districts such as those explored in this study which are predominately multigrade owing to relatively lower student numbers (Mulkeen & Higgins, 2009; Eppley, 2009). Multigrade teaching serves as a solution for offering educational opportunities to children in rural areas where teachers engage with students from multiple grades concurrently within a single classroom setting (Mulryan-Kyne, 2004; Little, Pridmore, Bajracharya, & Vithanapathirana, 2006; Brown, 2010). Studies on the prevalence of multigrade has shown that of the 1463 primary schools in Lesotho, 635 of them (46.8%) practice multigrade teaching (Lesotho Ministry of Education and Training [MOET], 2005). While almost all the ten (10) districts of Lesotho have their fair share of this situation, multigrade is most common in the rural areas of the country (MOET, 2005). Multigrade teaching in Lesotho is a complex situation thrust upon teachers because of necessity rather than choice. What is evident from the literature is that teaching in a multigrade classroom is an amalgamation of many factors such as personal, environmental as well as emotional factors.

1.1 Multigrade teaching

Multigrade teaching as a pedagogy of choice is a powerful pedagogic tool that can promote individual self-study and independent learning skills as children must develop effective study, research, and organizational skills, and must learn to take the initiative in making decisions about their curriculum and work (Adepoju, 2009). Could the benefits extend to situations where it is a pedagogy of necessity as is the case in the rural regions of Lesotho? Whether by choice or necessity, multigrade teachers must be skillful in a repertoire of teaching strategies to manage, organise and handle multigrade classrooms effectively (Hyry-Beihammer & Hascher, 2015). This implies that teachers who do not employ strategies appropriate for multigrade environments may adversely affect the way teaching and learning happen in such a classroom, consequently impacting the kind of education received by rural learners in general (Lingam, 2012).

1.2 Science teaching

Teachers are urged to use a variety of modes of instruction to accommodate the diversity of students as advocated for by differentiated instruction. Sulaiman, Suan, and Abdullah (2009) and Budiarmo, Sutarto, Mahardika, Putra, Sari, and Laela (2022) argue that teaching approaches such as those that can trigger learners' interest in science, allowing them to discover through an inquiry approach, to build learners'

understanding through a constructivist approach or using demonstration to introduce a concept are considered effective for teaching science. These strategies afford learners an opportunity to learn and to acquire the scientific process skills and approaches outlined and demanded by the scientific and technological learning area of the Lesotho syllabus.

2. Literature Review

2.1 Statement of the Problem

Multigrade teaching is not only challenging in terms of time allocated to each class but also in terms of transportation, poor economic conditions (where applicable), parents' education level, and language problems, be it in developing countries such as Africa, Asia, Latin America, and Turkey or in developed nations such as Austria and the Netherlands (Mulryane-Kyne, 2004; Condy & Blease, 2014; Engin, 2018). Studies carried out in Lesotho have indicated that children attending multigrade classrooms generally achieve lower performance levels in the Primary School Leaving Exam (PSLE) in contrast to their peers in conventional single-grade classrooms (Mulkeen & Higgins, 2009). This resonates with the finding of the study conducted in Fiji by Lingam (2012) where schools in rural areas dominated by multigrade were found to perform poorly in comparison to their urban counterparts.

A common denominator found to be the contributing factor to this unfortunate situation is the quality of teachers in these schools (Lingam, 2012). This is attested by Matobako and Heqoa (2017) study in Lesotho almost two decades later, shedding light on teachers' struggle with multigrade teaching and its challenges in the light of the new integrated curriculum. Their findings are substantiated by challenges of a multigrade classroom found in a study by Mulryan-Kyne (2004) about teachers' perceptions of multigrade teaching, indicating that teaching in multigrade classrooms is difficult to handle and less satisfying because of heavy workloads. Additionally, teachers believe that multigrade learners receive inferior education. Although there is extensive research on the relationship between rurality and multigrade teaching globally, particularly in Lesotho, a scarcity of studies exists focusing on classroom practices and the efficacy of strategies used in multigrade teaching. Thus, this study aims to examine the teaching practices of multigrade teachers and assess the effectiveness of their science teaching methods. This is because science teaching, unlike other subjects, demands the development of several investigative skills. One argues that multigrade on its own is a complex situation in which it may not be easy to meet the demands expected from the effective teaching of science (Hyry-Beihammer & Hascher, 2015). Knowing/Acknowledging? the importance of primary education, specifically in multigrade science teaching, the study seeks answers for/to? the following questions:

- Which pedagogical practices are adopted by teachers while teaching science in multigrade classrooms in Lesotho?
- Why do primary teachers use these specific pedagogical practices in multigrade classrooms?
- How do the pedagogical practices adopted facilitate development of scientific investigative skills demanded by the integrated curriculum?

2.2 Theoretical Framework

Several theories could be used to address different facets of multigrade teaching to attempt to embed and explain multi-grading and its appropriate practices, and thus understanding the research problems. Learner-centred approaches to teaching and learning are deemed inherent in a multigrade setting as literature reveals that while the teacher is busy with one group the other groups are left on their own for a large part of the day (Brown, 2010). Differentiation instruction (DI) is used to try to shed light on how learner-centered approaches can be practiced in a multigraded classroom. The theoretical framework behind differentiated instruction, especially in a multigrade classroom, is primarily rooted in constructivist theories of learning thus differentiated instruction theory forms the basis of understanding teaching and learning which takes place in a multigrade classroom,

Multigrade classrooms are complex by having more than one grade in a class with vast differences in age and learning abilities, all working at the time scheduled for a single grade. These differences present more challenges to the teacher than it is the case in a conventional single-grade classroom. The implication therefore is that multigrade teachers must be knowledgeable in several strategies involving planning, organisation, and applying appropriate teaching and assessment pedagogies. Differentiation of teaching is therefore considered an appropriate approach for a multigrade classroom which spans heterogeneity of learners (Napanan & Alinsug, 2021). Differentiated instruction is described as a deliberate and conscious method of planning and teaching

“... where teachers modify curriculum, teaching methods, educational resources, learning activities, and evaluation methods in correspondence with students differentiated needs with the purpose of maximizing their learning opportunities” (Stavroula et al., 2011, p.3).

It presents a modification in curriculum and a shift in teaching approaches towards those that accommodate a large span of learners' differences as it challenges a deep-rooted culture that emphasizes learner homogeneity and instead advocates for learner diversity (Little, 2005). Differentiated instruction comprises four aspects that a teacher must target such as differentiation of content, of product, of process as well as that of learning environment (Joseph, Thomas, Simonette & Ramscook, 2013). Figure 1 illustrates this.

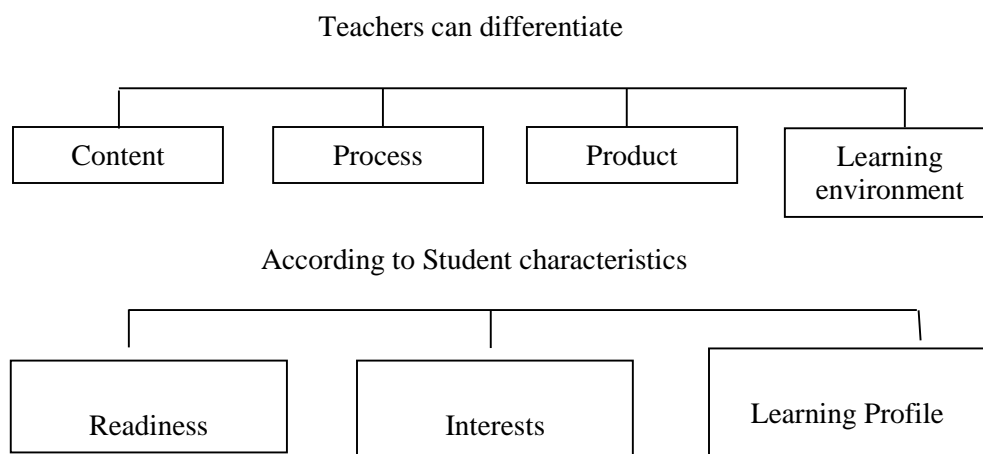


Figure 1: The Tomlinson model (Tomlinson, 2006)

Stavroulas (2015) and Coubergs et al. (2017) provide evidence that differentiated instruction effectively addresses students of diverse needs,. They found that students achieved higher academic outcomes when teachers applied DI compared to those without DI. Aspects of DI informed the development of the research questions and research instruments. By integrating socio-cultural constructivism with differentiated instruction, educators can create a responsive and inclusive classroom that supports the diverse needs of all students.

Differentiation by content is focused on what all learners should learn and master or on information they are supposed to have access to, which in the case of this research will be scientific knowledge and skills they have to develop (Joseph, Thomas, Simonette & Ramscook, 2013). Carry on here

Differentiation by process consists of the use of differentiated activities in a way that all learners comprehend, thereby making sense of the content and mastering the knowledge and skills they must acquire. The instruction principles of effective differentiation emanate from the use of constructivism learning theory, employing a hierarchical order of learning activities, maximizing learners' active participation in the learning process, and reducing teachers' talking time during teaching (Stavroula et al., 2011). It involves a choice of teaching strategies that match multiple intelligences, learners' learning styles and differing levels of readiness, as well as activities that help increase their conceptualisation of content taught, such as research and discovery, to mention just a few. Teachers can exercise flexible modes of grouping, peer teaching either in pairs or even in small groups allowing learners to work as individuals. Some of the tactics to employ a differentiated process are tiering activities or subject staggering. Tiering is a teaching technique whereby all learners work with the same concepts to acquire the same knowledge, understanding, and skills at different levels of difficulty. It involves deciding the purpose of tiering, creating innovative activities, and applying a method of assessment. On the other hand, subject staggering involves different grades working on different subjects and are taught in turn (Hyry-Beihammer & Hascher, 2015).

Differentiation by-product is a form of assessment as it involves different ways of measuring performance or demonstrating what is learned (Maduakolam & Ogo, 2010). It consists of multiple ways of differentiating the end results of learning by judging what learners know, and how much they understand or demonstrate the skills acquired. This could involve the use of pre-assessment using interviews, surveys, and ongoing assessment of learners. To accomplish this, there should be various ways by which they can show mastery of goals, accompanied by clear and appropriate success criteria (Maduakolam & Ogo, 2010).

Differentiation of the learning environment encompasses the ways the classrooms and school environment can be organized and work towards creating a sense of community. It should take into account the student learning profiles while the context of multigrade teaching should also acknowledge age differences, and levels of understanding (Maduakolam & Ogo, 2010). Effective multigrade teaching involves the use of a range of organisational strategies in the classroom, such as the use of whole-class teaching, small group, paired, and self-learning. According to Combrinck (2011), mastering classroom organization and management of space is paramount in the effective execution of multigrade teaching. There can be quiet corners where learners can work without distraction or corners that can accommodate collaborative work (Gregory, 2003).

3. Methods

3.1. Research Methodology

To answer the research questions, a concurrent triangulation mixed-methods research design based on the pragmatism paradigm was used. In this approach, social reality is regarded by multiple people who interpret the issue differently (Wahyuni, (2012). The issue in the case of this study is the instructional strategies used by multigrade primary teachers when teaching science. A qualitative approach in the form of interviews and classroom observations, and a quantitative approach using questionnaires were employed to gather data concurrently. The advantage of this method is that the strength of one method offsets the weakness of the other (McMillan & Schumacher, 2010). The researchers used this method to elicit rich information concerning the pedagogical practices of multigrade teachers while teaching science.

Sampling: The sample for the study was purposively selected by availability. The quantitative phase employed the use of a questionnaire for the 150 multigrade teachers who could be easily accessed by hand delivery or posting to their schools in the two rural districts of Lesotho. Some were approached while attending workshops or other professional activities. The qualitative sample consisted of 10 multigrade teachers who were not part of the quantitative study. These 10 teachers were interviewed along with the three district resource teachers (DRTs) who were selected based on a minimum of three years of multigrade teaching experience in teaching science. The DRTs were purposively drawn from the two districts. Eight science lessons were observed. The classroom observations were followed by interviews.

The paper reports on the findings from the 107 teachers of whom 55 were from Mokhotlong district while 52 were from Thabatseka district. Of these teachers, diploma holders constitute a higher percentage of 63.6%, followed by Cambridge Overseas School Certificate (COSC) holders at 19.6% comprising the majority of unqualified teachers, while degree holders numbered 7.7% with certificate holders and other qualifications sharing the remaining 4.7%. A total of 63% of these teachers have teaching experience of

more than 10 years, while 71% of them had not received any professional training for multigrade teaching during pre-service. Few teachers (29%) claim to have received multigrade training. This statistic was important since it indicates who the participants are in terms of their qualifications, experiences, and training, subsequently as informing their teaching practices.

3.1.1 Questionnaires

One hundred and fifty questionnaires, seventy-five per district, were hand-delivered to multigrade teachers in their schools or various teacher centres, or they were given to principals to distribute to their teachers. In this study, the questionnaires were piloted by giving them to eight multigrade teachers who were not part of the study population to ensure that respondents understood the questions as intended.

Only 107 of these 150 were completed correctly, five were spoiled and 38 were not filled in and were returned to the researcher.

3.1.2 Interviews

Face-to-face interviews using an interview schedule were conducted with the ten (10) multigrade teachers to elicit rich information on how their teaching happens. Three (3) district resource teachers (DRTs) who work with the schools regularly were conveniently selected to be interviewed to gain an insight into what they see happening daily concerning the pedagogical practices of teachers in the multigrade classrooms. Their information was considered important in supplementing the researcher's classroom observations as teachers could easily make a special effort when they knew they would be observed.

3.1.3 Classroom observations

The researcher observed and analysed eight (8) science lessons. An observation schedule was used to guide observations and hand notes were made of how the class ensued and the activities that took place. Science lessons were chosen because the researcher is a science teacher. Moreover, according to Sulaiman, Suan, and Abdullah (2009), there are several teaching approaches with different purposes, such as those that can trigger learners' interest in science, allowing them to discover through an inquiry approach, building learners' understanding through a constructivist approach or using demonstrations to introduce a concept. The researcher's knowledge and experience facilitated the observation and determination whether such methods were used. An observation schedule consisted of four parts, namely (a) class organization or grouping of grades, seating arrangements, and utilisation of space; (b) how the class resumed/proceeded.; (c) method used to teach, as well as activities used to drive science concepts development and handling of different grade learners; and (d) wrapping up the class and assessment.

3.2 Data Analysis

The quantitative data analysis involved descriptive statistics such as frequencies as well as running a chi-squared test. The program was used because it was strong in coding, ordering, structuring, retrieving, and visualising the gathered quantitative data (Bryman, 2012; Pallant, 2016). The SPSS Version 25 program, and Chi-square test was used to analyse quantitative data. A chi-square test is used to explore a relationship that exists between two categorical variables by comparing frequencies and proportions of occurrence of

each category (Pallant, 2016). Chi-square helps the researcher to determine whether a statistically significant relationship exists between two variables, employing Yates's correction continuity value to test hypotheses. This value is used because it is believed to compensate for the overestimate value of the chi-square. To be significant, the Yates's correction continuity value Sig. value must be .05 or smaller (Pallant, 2016). This value was coupled with effect size, phi coefficient to assess the strength of the relationship. The phi coefficient value can range from 0 to 1 with higher value indicating stronger association. Cohen's 1988 criteria were used with .10 indicating a small effect, .30 medium effect, while .50 indicate a large effect (Pallant, 2016). These statistical values are good for analyzing statistics involving two nominal variables such as 2 x 2 as was the case in the study or 2 x 3 comparisons (Morgan, Leech, Gloeckner & Barrett, 2013; Pallant, 2016). The qualitative data which were generated from classroom observations and interviews were analysed using aspects of differentiated instructions such as the process used and content to produce a pattern of issues studied (Creswell, 2014). The qualitative data was thematically coded and related thematic segments were grouped together and given different names.

3.3 Ethical clearance

Most educational studies involve the use of human beings, hence the need to solicit their consent as in the case of this study. According to Gay, Mills, and Airasian (2011) and McMillan and Schumacher (2010), ethical consideration entails clarifying what is proper and improper when conducting a study. This involved honest disclosure of all aspects of the study to the participants, including that they are free to withdraw from participation at any time. Before collecting the data, the researchers ensured adherence to the ethical considerations by gaining clearance from the University Ethics Committee. Permission was also requested and granted by the District Education Managers (DEM), the principals of the schools as well as the teachers involved. The principles of informed consent and voluntary involvement were upheld throughout the study.

4. Result and discussion:

The findings are presented as an integration of the results of questionnaires, interviews, and classroom observations where all three shared a similar question; therefore, a comparison of results can be made. The findings are presented following various aspects of differentiated instruction such as differentiation by content, product, process, and learning environment.

4.1 Learning Process

4.1.1 Lesson Planning

The starting point of any teaching is the lesson plan; therefore, it was important to establish this from the onset. The interviewees were asked to indicate how they planned for multigrade teaching: most of them indicated that they planned according to themes where possible. Teachers indicated use of teaching guides to help them to plan for a multigrade strategy:

“but in some cases where the topics ehhe the LO’s (learning outcomes) they are called the LO’s though they are not the same but they integrate then I combine the classes and keep on teaching them except whereby the LO goes further like in grade 5 we have to stop and go further with grade 6 (Teacher #6)

Another teacher agreed with the former teacher:

“E ee ere ha ke tla etsa lesson plan ebe ke nka syllabus le scheme book ke shebe na tse nyallannang e be ke life ho thuto engoe le engoe, ha ke li fumana ke li bokella moho e be ke li ruta moho ka nako e lengoe, ka lesson plan e le ngoe (Before I start planning I look through my syllabus and check if there are related concepts, if they are there I put them together in the scheme and teach both grade 3 and 4 the same thing at the same time with the same lesson plan, I do this for all the subjects” (Teacher# 1). Ha ke qeta ho ruta joale ke tla ba fa mosebetsi ke be ke qala hoba arola So after the lesson then in start giving them different taks, joale bana ke ba fa mosebetsi o ba lekaneng le bana ke bafa mosebetsi o ba lekaneng. (I only differentiate when I get to the assessment tasks then I give each grade work relevant for that particular grade (#1).

Almost all the teachers were unanimous in their responses that they planned and teach thematically where possible but stagger the activities for different grades when they got to the tasks. Moreover, they answered that when themes were not the same, they planned and taught grades separately. An interesting response, however, came from teacher #7 who is also a principal. He indicated that he did not plan at all and went on to explain how he considered planning a futile exercise:

“Kannete(Honestly) I will have to tell the truth, I no longer plan because even when I do then one or something can disrupt the planned lesson since I have I to multitask as I am also the principal so I don’t bother with the lesson plan anymore (Teacher#7)

This response corroborates with that of Lingam (2007) who indicated that multigrade teaching is even more stressful to principals who must carry out the administrative duties and attend meetings while they also have to teach their multigrade classes.

One teacher indicated that if he is introducing a new lesson to one grade, other grades should be given something to do. Should be prepared should have been prepared ehhe what we call ehhe.....what (DRT#1)

We ask them to assign the... when they allocate the classes to allocate them in such a way that they will be able to find the same concepts and plan them at the same time, and teach them at the same time, but the activities should vary according to the level of the grade they are teaching (DRT#3)

4.1.2 Learning Environment in the Teaching of Science

The most obvious step after lesson planning, according to differentiated instruction, would be classroom organisation or creating an environment for learning. This stage is important as it sets the tone for the space utilisation and execution of activities. This involves pairing of grades and selecting the learning

tasks. A summary of multigrades classrooms observed, and topics treated is given in Table 1 below. It would be remiss to not indicate that it was not easy to select one topic for all classes owing to the different mixing of grades: hence the use of any science-oriented topics.

Table 1: Summary of Grades Observed

| School # | Combined grades observed & number of learners | Topic (s) taught during observations |
|----------|---|--|
| 1 | 6 (12) 4 (9) | Common diseases in pigs: grade 5 Different types of wounds and taking care of wounds: grade 6 |
| 2 | 5 and 6 | Taught mathematics to both grades for whole morning. Refused to teach science topic |
| 3 | 5 (13) 6 (11) | Uses of thermometers to measure temperature: grade 5 Vertebrates and invertebrates: grade 6 |
| 4 | 5 (30) 6 (22) | Farm implements: grade 5 Preservation of meat: grade 6 |
| 5 | 1(15) 2 (13) | Use animal diagrams to form words Living and non-living things |
| 6 | 1(7) 1 absent 5 (1) absent 6 (6) 2 absent | Sounds of names: grade 1 - Shape and size of the earth: grade 6 |
| 7 | 3 (31) 4(33) | Garden tools for both grades and continue to their uses: grade 4 |
| 8 | 1 (5) 7 (11) | Domestic animals and their young: grade 1 Magnetism: grade 7 |

According to Combrinck (2011), mastering classroom organization and management of space is paramount in the effective execution of multigrade teaching. This formed the basis of the classroom observation. Observation drawn from Table 1 shows that the largest classrooms contained around 30 students as exemplified by school numbers 4 and 7, while in other schools there were fewer than 15 students. This represents a manageable group for the teacher to work with. In almost all eight schools, learners sat side by side in rigid rows, a method which does not allow the communication, or collaborative methods demanded by a learner-centred approaches. This is in line with what Berry (2006) indicated, namely that seating in a conservative manner does not allow a teacher to be adventurous. Combrinck (2011) contended that effective multigrade teaching involves mastering physical seating, arranging workstations and allowing spaces for classroom activities. The literature also emphasises the need to avoid the “dead time” where students spend considerable time not doing effective work. Grouping of grades such as grades 1 and 7 or 1,5 and 6 makes finding the same themes difficult, thus affecting the differentiation of content.

In the classrooms, learners were seated in a space designated for their grades separated by a line of desks mostly facing in one direction. All classrooms were spacious with enough space to allow activities. Almost all classrooms observed were furnished with enough desks and chairs for the learners; thus, capacity was not the issue while teaching multigrades. Chalkboards were divided by a line into grades, depending on pairing; for instance, if a classroom shared space between grades 5 and 6, then one side of the board would be for grade 5 and the other side for grade 6. Schools 2,5 and 7 were an exception as they were dealing with the same topic or theme. Even though the space and this seating arrangement allowed all learners to have access to the chalkboard, the arrangement did not encourage communication or collaborative methods that facilitate learner-centred learning. School 8 was an exception and had a unique arrangement as there was just one hall with various groups scattered randomly.

What can be drawn from these observations is that the last aspect of DI, namely the learning environment, is not utilized effectively. Issues observed ranged from combining grades that does not foster finding a common theme, to grouping as the whole class is observed rather than focussing on smaller groups. Not many activities were carried out by students despite spacious classrooms.

4.2 Teaching

One of the key factors in the teaching of multigrade teaching is the use of appropriate and effective teaching strategies (Brown, 2010). Therefore, it was important to establish the teaching practices that these teachers employed daily to teach science in multigrade classrooms. The next question on the questionnaire pertained to teaching strategies practised by teachers. The question was broken down into the strategies suggested in multigrade literature and the teachers were expected to either agree or disagree with the statements. The results of the questionnaire pertaining to this question are given in Table 1 as follows:

Table 2: Teaching in a multigrade classroom

| In a multigrade classroom | Agree | Disagree | Per cent |
|---|-------|----------|----------|
| 1. A shift from the traditional teacher-dominant teaching is encouraged | 42.5% | 57.5% | 100 |
| 2. A learner-centred teaching is expected | 93.9% | 6.1% | 100 |
| 3. Learners are encouraged to take responsibility for own learning | 94.2% | 5.8% | 100 |
| 4. A teacher teaches a theme to all groups at the same time | 50.5% | 49.5% | 100 |
| 5. A teacher teaches one group while the other group works on its own | 82.4% | 17.6% | 100 |
| 6. Learners serve as peer teachers | 82.0% | 18.0% | 100 |
| 7. A teacher makes use of specially designed guides | 80.6% | 19.4% | 100 |
| A teacher makes use of specially designed instructional material | 83.0% | 17.0% | 100 |

Analysis of data in Table 2 shows a high percentage of teachers agreeing with almost all the statements, implying that teachers use some of the multigrade teaching strategies even though they may not be aware. However, whether they were using these strategies in practice was established through classroom observations. An important observation was made where an almost equal percentage, namely 50.5% agree and 49.5% disagree with statement 4 where they had to indicate whether one theme is taught to all groups at the same time. This could imply lack of knowledge of this skill.

Teachers were also asked during the interview how classroom practices unfolded. Interviewees' responses corroborated the questionnaires as follows:

“when teaching in the classroom I give the other group the other grade group work while I proceed with the other one even having done with grade 6 I give them some work to do and go back to grade 5” (Teacher # 8)

“I always prepare the activities for grade 1 to do so that I can deal with grade 2” (Teacher # 9)

“ I introduce the topic to one grade and leave them with some reading to do about that topic and then proceed to teach another grade” (Teacher # 1)

Teacher #4 concurred with teacher #1 *“ I look at my topics and look at the one that is easier for the learners to handle and do on their own and deal with it first, so when I leave them with work I can then concentrate on the most difficult one.*

From these results one can conclude that the most common method of teaching for these teachers is staggering whereby different subjects are taught at different times.

On probing how learners work while left alone and the teacher is busy with the other grade, the responses were as follows:

“Sometimes they work individually sometimes they do it in groups. But you know small children do not cope when they are in a group they need to always be under the eye of the teacher” (Teacher # 9)

“In my case each grade occupies its own classroom because we have a lot of classes but few teachers, so after teaching them I leave them with either group work when I want them to discuss or share ideas or individual work depending on activities given, but I still monitor them by checking on them regularly (Teacher #7).

One teacher indicated that since there is repetition of work for a senior grade when grades are taught together. Those who are in the advanced grade lead the discussion when they are left alone – a situation called peer tutoring.

“Bohlokoa ba eona ke hore o tla fumana hore haeba e ne le magrade 5 last year and this year e sele ma grade b a se bana le kutloisiso e betere me ba thusa ho sala ba rut aba bang ha ke le ka class engoe (The advantage of having mixed grades is that those who are in the

grade 6 this year were in grade 5 last year so they have a better conception of concepts and can help teach those of lower grades in my absence” (Teacher #4).

The use of older learners to monitor and peer teach is also another interesting finding from the results, in line with what is suggested in the literature.

Some of the strategies such as teaching thematically where learning outcomes (LOs) allowed and teaching in a quasi-monograde way were also observed during classroom observation. However, strategies such as allowing learners to take responsibility of own learning by use of worksheet cards with self-assessing tools were not observed. Peer tutoring, although indicated during interviews and questionnaires, was also not observed. Use of specially designed self-instructional material was not observed in schools 5 and 7 where learners were to form words using the animals indicated on cards. This was contrary to more than 80% of teachers indicating in questionnaires that they use them. Teaching was mostly teacher talk interspersed with question here and there. According to the results, 57.5% of them disagreed that there should be a shift from teacher dominance. At the same time, this shows a contradiction to more than 90% of them saying they use a learner-centred method. This was an important observation because teacher dominating the talk leaves little learning, no interaction and thus denies learners’ development of required skills.

4.2.1 Teaching science

For effective teaching of science, investigations of scientific phenomena must be conducted interactively. Therefore, how learners are seated and the availability of materials to manipulate in a multigrade classroom play a major role (Berry, 2006; Brown, 2010). As indicated in section 4.1.2 the classroom observed showed ample space for activities. Since the research question relates to how the teaching of science occurred in the classroom, the next question established that, and the results of which are presented in Table 2 as follows:

Table 3: Teaching of Science in a Multigrade Classroom

| Teaching science | Agree | Disagree | Per cent |
|---|-------|----------|----------|
| Help learners to take responsibility of own learning | 92.2 | 7.8% | 100 |
| Teach a theme to all groups at the same time | 52.0% | 48.0% | 100 |
| Give different tasks to grades | 86.9% | 13.1% | 100 |
| A teacher teaches a theme to all groups at the same time | 82.7% | 17.3% | 100 |
| Help learners to carry out experiments | 92.0% | 8.0% | 100 |
| Help learners to carry out investigations | 79.8% | 20.2% | 100 |
| Make use of specially designed activity sheets to help learners develop scientific skills | 87.0% | 13.0% | 100 |
| Make use of a science kit to help learners develop scientific skills | 92.0% | 8.0% | 100 |
| Do group experiments | 94.1% | 5.9% | 100 |
| Give demonstrations | 91.8% | 8.2% | 100 |

Data in Table 3 shows high percentages of teachers agreeing that they help learners carry out experiments and investigations as well as making use of specially designed activity sheets that guide the development of scientific skills. During interviews teachers were then asked how they handled the teaching of science in a multigrade classroom. The teachers gave a great variety of responses relating to this question; for instance, one teacher said:

".. ehh to experimenting discovery ehh. Yes, I do my teaching method for example when I was teaching about oxygen I will put in a bottle without holes and the other one I will make it to have holes so they will see that there was oxygen in the bottle, but this finished it but ... that is why it.? When I work with those insects, I will ask them to come with the insects prior... then I will say put this locust in the bottle then I will say check them this one are dead while these ones are still alive why are they still alive?" (Teacher #5)

"... discovery teaching. This science subject ehh using the material so that they touch they smell they see they we so that they use all their sense organs" (Teacher # 9)

Other teachers seem to concur with the previous teacher that learners must discover things for themselves by using demonstration, discussion, and experiments. However, they indicated that doing experiments in a multigrade classroom is not easy owing to the time factor and lack of resources.

"...is it not easy to do experiments in a multigrade class, ... I must emphasise that it is not easy if there are no experimental resources or materials, then one resorts to doing demonstration) (Teacher #4)

However, one teacher indicated the advantage of having mixed grades when doing the same experiments as helping those in upper grades to revise what they did the previous year and makes execution of experiments easy as they help in setting up apparatus and explaining to their junior learners.

"Hona moo ke moo o tlang ho bona hore ba ka pele ba hopola ba tsoara kapelenyana, ha ba bang ba batla hore o ba khanne ka lipotso ho ba tataisa e be ba baholoanyane ba ba thusa (That is where you will realise the importance of mixed classes the one in upper grade remembers what they did and learn fast and help assist those who are still struggling" (Teacher #1).

One teacher specifically indicated that science was not his strong point since his schooling days hence he did not have that much interest in teaching the subject. This was a very interesting observation in terms of teaching and learning as it raises questions on content knowledge and pedagogical content knowledge and how they unfold in the classroom of such a teacher. Unfortunately, his school is very far away and not easily accessed, it could have been interesting to observe his teaching. It also makes one wonder how many teachers also share the same sentiment, and if the poor performance observed is due to multigrade or lack of subject matter knowledge and its execution in the classroom.

I didn't specialize in science. I use to fail science courses. As a learner I did not have a good science foundation, as a result I did not develop interest in the subject) (Teacher # 7).

“nka bua ka listening skill “Experimentation because they see, they manipulate we want them to find things on their own but without the resources....” (Teacher # 10)

There seems to be a contradiction between what the teachers indicated in the questionnaires where a large percentage of them indicated the use of investigations and interviews, where they indicated a lack of resources making it difficult for them to do experiments.

District Resource Teachers (DRTs) as teacher support systems in districts and mainly working with the multigrade schools’ interviews, however, paint a completely different picture when asked how they see teaching happens in their frequent visit to schools. Some of their answers:

“.. we are expecting the teacher ehh teachers should not just talk, the learners should manipulate, ..” (DRT # 1)

“We want them to encourage learners to find things for themselves. We usually want them to use experiments but ... in most cases they are not doing them.” (DRT#2).

However, this is what DRTs said they observed as the reality in the multigrade classroom:

“We want them to encourage learners to find things for themselves, but they are the ones that are spoon feeding the learner: It’s because they are not planning their work.... Sometimes the materials are not there”. (DRT #2).

“I just see them lecturing, they don’t collect material they stand there and just tell learners and so and so forth it is not done practically nothing to manipulate... They just say that because they are overloaded, they don’t have enough time to plan and to collect that is what they say” (DRT#3)

It was therefore important to conduct classroom observations to establish what was happening in those classrooms. The results of the observation corroborated what the DRTs had said. Teachers mostly used traditional teacher-centred methods where they mostly talked to give explanations of concepts while learners either passively listened or answered some questions. This method does not allow inquiry-based learning where learners can interact with each other and individually with the materials with the purpose of constructing their own knowledge, as indicated by the differentiated instruction. Then the teachers would leave the grade with some individual tasks to do while they moved to the next grade and the same teaching process was repeated in what is called a quasi-monograde strategy. This way of teaching is found to greatly reduce instruction time for each grade; hence teachers complained that they rarely complete the prescribed syllabus for a grade:

“we don’t do much we don’t give learners more of what they are expected to do... if I have to spend 40 minutes with a topic it might take me an hour. so topics not finished I put them under brought forward” (Teacher #8)

Another important observation was that learners tended to work either in pairs or helped one another when left alone, thereby confirming what was said during interviews. Therefore, there is unplanned peer help.

This is an opportunity a teacher could have exploited by the use of specially designed worksheets to ensure that meaningful learning took place in the teacher's absence.

Nevertheless, most teachers were found to be unable to utilise the opportunity provided by small learner numbers and spacious classrooms to engage learners in strategies that were effective for teaching science in multigrade situations. These strategies are collaborative learning, peer tutoring, and across grade grouping, among others. There was little chance afforded to the learners to manipulate materials and investigate problems as demanded by the scientific and technological learning area. This was contrary to what was indicated in interviews and on questionnaires. In school 8 they were dealing with magnetism; the teacher was doing the talking, telling them what to watch for, thus channelling their thinking. Well-prepared work cards would have allowed learners to explore, to write up their observations, formulate their own hypotheses about what they expected to happen, and draw conclusions. This could have made the lesson more worthwhile and allowed the development of some investigative skills. This lack of foresight to prepare well-designed worksheets for learners left alone by the teachers and failure to capitalise on the opportunities provided by multigrade classrooms lead one to believe the teachers' pedagogical practices are not that effective. Teachers cited a lack of resources and time, and the need to rush to another grade as demanded by multigrade teaching as their reasons for being unable to develop work cards as they had indicated they used during questionnaires.

To substantiate the results obtained, the quantitative result hypotheses were tested, and their results were reported one at a time as follows:

4.3 Hypotheses

4.3.1 Hypotheses 1

H_0 = There is no statistically significant relationship between effective classroom management and in-service training in multigrade teaching.

H_1 = There is a statistically significant relationship between effective classroom management and in-service training in multigrade teaching.

A chi-square test for independence using Yate's continuity correction showed a significant relationship between effective classroom management and in-service training in multigrade teaching, $X^2 (1, n = 94) = 2.5, p = .11, \phi = -.20$. Therefore, the null hypothesis is disproved, and the alternative hypothesis is upheld with a minor effect size observed.

4.3.2 Hypotheses 2

H_0 = There is no statistically significant relationship between teachers teaching one grade while the other grade works on its own and in-service training in multigrade teaching.

H_1 = There is a statistically significant relationship between teachers teaching one grade while the other grade work on its own and in-service training in multigrade teaching

A chi-square test for independence using Yates continuity correction showed a significant relationship between teachers teaching one grade while the other grade worked on its own and in-service training in multigrade teaching, $X^2(1, n = 93) = 6.6, p = .01, \phi = -.03$. Consequently, the null hypothesis is rejected in favour of alternative hypothesis with a negligible effect size noted.

4.3.3 Hypotheses 3

H_o = There is no statistically significant relationship between teachers simultaneously teaching the same theme to all grades and in-service training in multigrade teaching.

H_i = There is a statistically significant relationship between teachers simultaneously teaching the same theme to all grades and in-service training in multigrade teaching.

A chi-square test for independence using Yates's continuity correction showed no significant relationship between teachers' teachers simultaneously teaching the same theme to all grades and in-service training in multigrade teaching, $X^2(1, n = 95) = 3.55, p = .06, \phi = .22$. Therefore, the null hypothesis is supported, and the alternative hypothesis is dismissed with a moderately small effect size observed.

What can be concluded from the tests is that in-service training offered to multigrade teachers has little impact on their choice of method of teaching and the execution of such a method.

5. Findings

The findings that emerged from the quantitative and qualitative data collected in this study are:

5.1 Finding on teaching strategies

Where learning outcomes from different grades differ, teachers plan and teach in a quasi-mono-graded way where they teach one grade and leave them with some work while going to teach another grade. This is called staggering subjects. There were no well-designed activity sheets in the schools observed. As a result, this practice leads to a great deal of dead time where no productive teaching happens. Where learning outcomes share the same theme, they teach thematically, only differentiating the given tasks. However, less tiering of activities to accommodate different learners was observed. Grouping of the grades is important in making staggering or tiering of activities plausible.

However, in some of the groupings, such as multigrading grades 1 and 7 and 1, 5, and 6 as was observed, it is not easy to differentiate the content. Possibly, if closer grades were multigraded it would help as concepts tend to spiral better. This is not supported by what Gregory (2003) indicated, namely that choice of teaching strategies which allows for tiering of activities is pertinent. An important observation is the obvious use of peer teaching and class monitoring by higher graders to lower grades while learners are left on their own, working individually or in groups. These higher graders also seem to play a bigger role in helping the teacher to set up and carry out experiments as in most cases what is taught is the repetition of what they already learned. This also helps them to revise and develop a greater understanding of what they had done in the previous year. This was an important observation since some of the schools have only two teachers; therefore, higher graders may be equipped with skills and well-prepared work. Therefore, they help keep younger ones busy and help maintain order in the absence of the teacher.

The dominance of the teacher-centred chalk-and-talk method observed restricts active learner involvement in the learning process. As such, it denies learners opportunities to construct their knowledge as corroborated by literature that multigrade classrooms are dominated by quasi monograde. Kivunja (2014) and Mulkeen and Chen (2008) indicate that a multigrade classroom is not a normal classroom situation as it consists of a large span of learners who differ in ability. Moreover, teaching in a multigrade classroom demands a well-trained and innovative teacher who is able to meet the challenges afforded by such a class and can afford learners' optimal involvement in their learning process with a variety of engaging activities that reduce teacher talk time.

5.2 Finding on lesson planning

The results of the study show that teachers plan using the syllabus and a teachers' guide meant for a monograde classroom. They are guided in carrying out their work by the orientation to multigrading they have received and by the help of teachers' guides or DRTs. Where grades do not share a theme, they plan classes separately and this is very common. However, occasionally, owing to grades grouping where the grades share the same theme, they plan thematically. This planning does not allow a teacher to make good use of the available time or manage effort and resources effectively. Thus, it does not correspond with the views of Nesari and Heidari (2014) and Valiande, Kyriakides and Koutselin (2011), namely that differentiated instructions involve teachers being able to modify the curriculum. Their teaching methods are important when they plan their lessons.

5.3 Findings on grades arrangement, classroom organization, and management of space

According to Berry (2006) and Combrinck (2011), mastering classroom organization and space are crucial for effective execution of multigrade teaching. The findings do not support this as, learners sat side by side in rigid rows and columns – a method which does not allow communication, or collaborative methods demanded by a learner-centred approaches. The results also show that the combination of grades is haphazard and does not show deliberate planning. Low grades combined with higher grades makes finding the common themes difficult, and thus encourages monograde teaching, thus affecting the differentiation of content.

5.4 Findings on execution of science lesson

There was not much inquiry or discovery in the teaching of science in the observed lessons; hence there was no development of scientific skills as lessons observed were dominated by chalk and talk. This approach does not afford the learners chance to actively engage mentally and physically with the concept. Teachers have indicated that multigrade teaching involves a great deal of work, starting from when they must plan for teaching more than one grade in the time allocated for one grade, to organising the activities and executing the lesson. As a result, all four aspects of DI content, process, product, and learning environment were generally minimally addressed. Thus, one can argue that not much learning, and not much learning of science happens in these multigrade classrooms. This is supported by Matobako and Heqoa's (2017) study which showed the teachers' struggle with multigrade teaching and its challenges in the light of the new integrated curriculum in Lesotho.

5.5 Findings on multigrade teachers' challenges

The multigrade challenges identified in Lesotho are mostly the same as those experienced worldwide Haingura (2014), and can be grouped into micro, meso and macro (Gardner, 2008). Micro are those related to individual teachers, such as having overwhelming workloads, hence no time to prepare well for the class and execute scientific investigations and lack of training. The micro challenges are those that are beyond the school such as lack of curriculum documents to guide teachers and lack of training. The meso are those that relate to the school environment such as negative attitudes towards multigrade teaching, lack of resources, both human and material.

5.6 Conclusion and recommendations

These findings shed light on the number of challenges associated with the multigrade situation in Lesotho and the impact of this on the students being taught in multigrade classrooms. The study provides necessary data that can be utilised in the formulation of multigrade policy and appropriate training strategies. The study recommends that teachers receive comprehensive training programmes focusing on four components of DI content, process, product and learning environment, which should be coupled with a diverse range of effective teaching strategies specifically designed for teaching science in multigrade classrooms. This training should encompass techniques for effective tiering, subject staggering, the development of self-assessment activity sheets, appropriate grade grouping methods, and the utilisation of space for optimal teaching and progress tracking across the grades. Equipping teachers with these skills will facilitate smoother content delivery, ultimately benefiting the 46.8% of students who experience disadvantages in multigrade learning environments.

6. Declaration

This article is generated from the academic thesis submitted by the researcher towards the D. Ed. study under the supervision of the co-authors.

References

- Adepoju, T.L. (2009). Planning and policy models for multigrade teaching techniques in Nigerian schools. *ejournal of Education Policy*. Retrieved February 20, 2016, from http://www.researchgate.net/publication/316989665_Planning_and_Policy_models_for_Multigrade_Teaching_Technique_in_Nigerian_Schools
- Berry. C. (2006). Achievement effects of multigrade and monograde primary schools in the Turks and Caicos Islands. *International Journal of Educational Development*, 21(6), 537-552. [https://doi.org/10.1016/S0738-0593\(01\)00014-1](https://doi.org/10.1016/S0738-0593(01)00014-1)
- Brown, B. A. (2010). *Multigrade teaching. A review of issues, trends, and practices, implications for teacher education in South Africa*. Johannesburg: Centre for Education Policy Development (CEPD).
- Bryman, A. (2012). *Social research methods*. Oxford: Oxford University Press.
- Budiarso, A. S., Sutarto, S., Mahardika, I. K., Putra, P. D. A., Sari, D. N. I., & Laela, F. N. (2022). The validity and practicality of the contextual analysis of science and laboratory problems

- (CANLABS) learning model in science learning. *Jurnal Penelitian Pendidikan IPA*, 8(1), 94-102. <https://doi.org/10.29303/jppipa.v8i1.1069>
- Creswell, J.W. (2014). *Research design qualitative, quantitative and mixed methods approaches*. Los Angeles: Sage Publishing.
- Combrinck, M. (2011). Concept of rurality: Curriculum visions for a multigrade pedagogy school of education studies. *South African Rural Educator*, 1,16-29.
- Coubergs, C., Struyven, K., Vanthournout, G., & Engels, N. (2017). Measuring teachers' perceptions about differentiated instruction: The DI-Quest instrument and model. *Studies in Educational Evaluation*, 53, 41-54. <https://doi.org/10.1016/j.stueduc.2017.02.004>
- Condy, J., & Blease, B. (2014). What challenges do foundation phase teachers experience when teaching writing in rural multigrade classes? *South African Journal of Childhood Education*, 4(2), 36-56. Retrieved from <https://www.scielo.org.za/pdf/sajce/v4n2/04.pdf>
- Department of Basic Education. (2020). *Multigrade National Revised Annual Teaching Plan for Natural Science and Technology: Grade 4 – 6*. <https://www.education.gov.za/Hom/RecoveryPlan2020.aspx>
- Eppley, K. (2009). Rural schools and the highly qualified provision of No Child Left Behind: A critical analysis. *Journal of Research in Rural Education*, 24(4), 1-11.
- Engin, G. (2018). The opinions of the multigrade classroom teachers on multigrade class teaching practices (multiple case analysis: Netherlands-Turkey example). *International Journal of Progressive Education*, 14(1), 177-200. <https://files.eric.ed.gov/fulltext/EJ1170067.pdf>
- Gardiner, (2008). Education in rural areas. *Issues in Education Policy*, 4, 1-34.
- Gay, L.; Mills, G. & Airasian, P. (2011). *Educational Research: Competencies for Analysis and Applications* (10th ed.). Boston: Pearson.
- Gregory, G.H. (2003). *Differentiated instructional strategies in practice*. Thousand Oaks: Corwin Press.
- Haingura, S. S. (2014). *An investigation of multigrade teaching at the three primary schools in the Kavango Region, Namibia*. Master's research Report. Retrieved from https://scholar.sun.ac.za/handle/haigura_investigation_2014.pdf
- Hryy-Beihammer, E. K., & Hascher, T. (2015). Multigrade teaching practices in primary education as a promising pedagogy for teacher education in Austria and Finland. *International Journal of Educational Research* page, 22(C), 89 -113. <https://doi.org/10.1016/j.ijer.2015.07.002>
- Joseph, S. & Thomas, M., Simonette, G. & Ramsook, L. (2013). The impact of differentiated instruction in a teacher education setting: Successes and challenges. *International Journal of Higher Education*. <https://doi.org/10.5430/ijhe.v2n3p28>
- Kivunja, C. (2014). Innovative pedagogies in higher education to become effective teachers of 21st century skills: Unpacking the learning and innovations skills domain of the new learning paradigm. *International Journal of Higher Education*, 3(4), 37-48
- Lingam, G.I. (2007). Pedagogical practices: The case of multi-class teaching in Fiji primary school. *Educational Research and Review*, 2(7), 186-192. Retrieved from <https://academicjournals.org/journal/ERR/article-full-text-pdf/9150B443547>
- Lingam, G.I. (2012). Preparing teachers for rural schools: An empirical evidence from a Fiji case. *Greener Journal of Educational Research*, 2(2), 1-12 <https://pdfs.semanticscholar.org/c7bf/9dc0953dc1353b9437e05dc47f0e56f8d9b8.pdf>

- Little, A.W. (2005). *Learning and teaching in multigrade settings*. Paper prepared for the UNESCO 2005 EFA Monitoring Report. <http://www.researchgate.net/publications>
- Little, A.W., Pridmore, P., Bajracharya, H., & Vithanapathirana, M. (2006). *Learning and teaching in multigrade settings (LATIMS): A final report to the Department for International Development*. London: Institute of Education. <http://multigrade.ioe.ac.uk/fulltext/fulltextLittle.pdf>
- McMillan, J. H., & Schumacher, S. (2010). *Research in education: Evidence-based inquiry*. Boston: Pearson.
- Maduakolam, I. & Ogo, T.I. (2010). Differentiating instruction to meet the needs of diverse technical/technology education students at the secondary school level. *African Journal of Teacher Education*, 1(1),106-114.
- Matobako, S & Hequa, S. (2017). The implications of a new integrated curriculum for crowded and multigrade classes in Lesotho primary schools. In M. Mapheleba, (Eds), *Education in Lesotho prospects and challenges*. Nova Publishers
- Ministry of Education and Training (2005). Education sector plan 2005-2015. Maseru: Bee Pee Printers and Stationers.
- Ministry of Education and Training (2009). Medium term sector plan 2009-2012. Maseru: BeePee Printers and Stationers.
- Ministry of Education, Secondary School Instruction, Elementary and Preschool Instruction, "Senegal Training Manual for Multigrade Teachers" (2009). *Learning initiatives for rural education*. 6. Retrieved from https://scholarworks.umass.edu/cie_lire/6
- Morgan, G.A., Leech, N.L., Gloeckner, G.W., & Barrett, K.C. (2015). *SPSS for intermediate statistics: Use and interpretation* (5th ed.). Abingdon, UK: Routledge.
- Mulkeen, A. G. & Chen, D. (2008). *Teachers for rural schools experiences in Lesotho, Malawi, Mozambique, Tanzania & Uganda*. African Human Development Series. Washington, DC: World Bank.
- Mulkeen, A., & Higgins, C. (2009). *Multigrade teaching in sub-Saharan Africa: Lessons from Uganda, Senegal and the Gambia*. Washington: World Bank. Retrieved from Retrieved from <https://issuu.com/world.bank/publications/docs/9780821380659>
- Mulryane-Kyne, C. (2004). Teaching and learning in multigrade classrooms: What teachers say? *The Irish Journal of Education*, 35, 5-19. Retrieved from <http://www.jstor.org/stable/30077492>
- Naparan, G. B., & Alinsug, V. G. (2021). Classroom strategies of multigrade teachers. *Social Sciences & Humanities Open*, 3(1), 100109, 1-6. <https://doi.org/10.1016/j.ssaho.2021.100109>
- Nesari, A. J. & Heidari, M. (2014). The important role of lesson plan on educational achievement of Iranian EFT teachers' attitudes. *International Journal of Foreign Language Teaching & Research*, 3(5), 25-31.
- Pallant, J. (2016). *SPSS survival manual: A step by step guide to data analysis using SPSS program* (6th ed.). London, UK: McGraw-Hill Education.
- Stavroula, V.A, Leonidas, K., & Mary, K. (2011). *Investigating the impact of differentiated instruction in mixed ability classrooms: Its impact on the quality and equity dimensions of education effectiveness*. Paper presented at the International Congress for School Effectiveness and Improvement. Springwood, New South Wales, Australia.

- Stavroulas, V. (2015). Evaluating the impact of differentiated instruction on literacy and reading in mixed ability classrooms: Quality and equity dimensions of education effectiveness. *Studies in Educational Evaluation*, 45, 17-26. <https://doi.org/10.1016/j.stueduc.2015.02.005>
- Sulaiman T. I., Suan W. H., & Abdullah S. K. (2009). Effective teaching approach employed by primary school science teachers. *US-China Education Review*, 6(10), 67-75.
- United Nations Educational, Scientific, and Cultural Organization (UNESCO). (2020). *Global education monitoring report, 2020: Inclusion and education: All means All* (3rd ed.). Paris France: United Nations Educational, Scientific and Cultural Organization. <https://doi.org/10.54676/JJNK6989>
- Valiande A. S., Kyriakides, L., & Koutselini, M. (2011). *Investigating the impact of differentiated instruction in mixed ability classrooms: Its impact on the quality and equity dimensions of education effectiveness*. Paper presented at the International Congress for School Effectiveness and Improvement. Springwood, New South Wales Australia.
- Vithanapathirana, M. V. (2006). *Improving multigrade teaching: Action research with teachers in rural Sri Lanka*. Unpublished PhD thesis. Institute of Education University of London.
- Wahyuni, D. (2012). The research design maze: Understanding paradigms, cases, methods and methodologies. *Journal of Applied Management Accounting Research*, 10(1), 69-80.
- World Bank. (2005). *Lesotho: An assessment of the investment climate*. Washington, DC. Retrieved on March 20, 2015, from © World Bank. <https://openknowledge.worldbank.org/handle/10986/8717>