

Trainee and Trained Secondary School Science Teachers' Conceptions of Inclusive Education: Challenges and Experiences Faced in an Inclusive Set up in Kitwe, Zambia

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DOI : <https://dx.doi.org/10.47772/IJRISS.2024.805078>

Received: 16 April 2024; Revised: 01 May 2024; Accepted: 06 May 2024; Published: 07 June 2024

ABSTRACT

Background: Inclusive education is a fundamental right recognized by national and international policies. Article 69 of the United Nations (2016) General Comment CRPD/C/GC/4 emphasizes the need for comprehensive teacher education across all educational levels—preschool, primary, secondary, tertiary, and vocational—to equip educators with essential core competencies and values for working in inclusive environments. The Government of the Republic of Zambia has taken significant strides by mandating a compulsory inclusive schooling module in all teacher training institutions since 2010, demonstrating its commitment to upholding the rights of people living with disabilities.

Aim: This study investigates the understanding, challenges, and experiences related to inclusive education among both trainee and trained secondary school science teachers. Specifically, it explores their perspectives within selected inclusive education practices in secondary schools and a university that provides training in inclusive pedagogies in Kitwe district, Zambia.

Methods: A qualitative case study design was employed, involving 12 participants: six science teachers and six trainee science teachers. These participants were purposively selected from three secondary schools recognized as successful inclusive schools and a university specializing in training secondary school science teachers in Kitwe district, located in the Copperbelt Province of Zambia. Data collection methods included semi-structured interviews and focus group discussions. Thematic analysis was applied to analyse the collected data.

Findings: The study revealed a disconnect between the concept of inclusive education as defined by the Ministry of Education and the UNESCO definition. While teachers generally understood the concept, challenges persisted in translating theory into effective classroom practice. Notably, there were discrepancies in implementing inclusive strategies, accommodating diverse learners, and fostering an inclusive ethos. Teachers predominantly associated inclusive education with educating children with disabilities within mainstream schools. Interestingly, student teachers included pedagogy in their understanding of inclusive education. Inadequate funding, the scarcity of teaching and learning materials, limited time allocation within busy curricula, lack of training in inclusive education pedagogies made meaningful inclusion challenging! These findings underscore the need for targeted professional development and support to bridge this gap and enhance the practical application of inclusive education principles.

Conclusion: Drawing from the study's insights, the following conclusions can be drawn: Both trainee and trained secondary school science teachers often misconstrue inclusive education as mere mainstreaming of children with special needs. The distinction between integration and genuine inclusion remains blurred. To foster true inclusion, therefore, it is recommended that educators must grasp the holistic essence of inclusive education beyond surface-level practices.

Keywords: Inclusive education, integration, main streaming, trainee teachers, trained teachers, children with special education needs, children with disabilities, challenges, pedagogies.

BACKGROUND

Inclusive education, recognized as a fundamental right by national and international policies, aims to provide equitable opportunities for all learners, including those with special educational needs (SEN). However, students identified with SEN often face exclusion from mainstream schools due to deterministic beliefs. The challenge lies in bridging the gap between policy intentions and effective implementation. Hart et al. (2007) highlight that students with SEN are particularly vulnerable to exclusion from the cultural, curricular, and communal aspects of mainstream schools because of the determinist beliefs that underpin them. Classrooms represent diverse needs, including those of learners with special needs. Evans (2000) emphasizes that integrating these learners into regular schools remains a global goal and challenge.

The Ministry of Education Science, Vocational, Technology and Early Education (2015) gives the following categories of learners with disability; Intellectual Disability, Learning Disability, Physical Disability, Health Impairment, Hearing Impairment, Visual Impairment, Deaf-blind, Attention Deficit and Hyperactive Disorder, Autism, Emotional Behavioural Disorder, and Multiple Disabilities. These, among many other groups of disadvantaged learners, are the target when we talk about inclusive education in Zambia.

International and national recognition of the importance of inclusive education is acknowledged through article 69 of the UN (2016) General Comment CRPD/C/GC/4 which emphasizes the need for comprehensive teacher education at all levels (pre-school, primary, secondary, tertiary, and vocational). Teachers, therefore, must acquire core competencies and values to work effectively in inclusive environments. The Zambian government has taken significant steps by mandating a compulsory inclusive schooling module in all teacher training institutions since 2010. This commitment aims to uphold the rights of disabled individuals and ensure that all learners receive appropriate attention.

The concept of inclusive education emerged from the efforts of disability groups that demanded equal treatments and opportunities for disabled people to participate equally in their communities (Stubbs, 2008). Inclusive education despite being a key policy in several countries, has been an issue of international debate about what it really means, especially in relation to people with disabilities' access to education.

Miles and Singal (2010) for instance, state that the initial vision of the International Education for All (EFA) goals was extremely broad and ambitious but the rhetoric of 'all' has overlooked the issue of disability and failed to reach the poorest and most disadvantaged children. Ainscow and Miles (2008) however, are of the view that inclusive education will be defined and enacted in different ways, different places, depending on the purpose and the nature of schooling, how it is organised, who has access to it and who is denied access. Stubbs (2008) on the other hand, acknowledges that there are many different understandings and interpretations which can affect whether outcomes of inclusion are successful or sustainable.

Disparities have however, been observed. For example, some have argued that confusion over inclusive education is because of the inheritance of the paradoxes and contradictions of integration. Integration policies are aimed at making the individual fit in the existing school structures while on the contrary the structures which hinder such functioning are the target of inclusion policies (Miles, 2000).

Others highlight the danger of the inclusive movement remaining at the level of rhetoric. This makes inclusive education to be understood in a limited way, especially when it is perceived to apply to a particular group, and when it is equated with a particular type of education or location, which leads to special being exclusion (Slee & Allan, 2005). Further, some of the policies that claim to address inclusive education are integration policies which are limited to disabled learners or those experiencing learning difficulties.

Despite the vast literature on inclusive education, the term remains ambiguous and problematic. Burnett (2019) argues that the term inclusion has become a 'suitcase' word, where the word is used in such a way that people

put whatever they want to put into its meaning. As such, there is no single context of inclusive education that applies across all contexts (Price, 2018) and no agreed upon definition of inclusive education.

However, Miles et al. (2018, p. 74) consider the concept of inclusive education to be about ‘removing physical, attitudinal and structural barriers and enabling the social and academic participation of all learners, while recognising the specific barriers some children with disabilities can face in mainstream setting’. Further, Eunice, et al. (2015, p. 39) view inclusion in education as ‘a process of addressing and responding to the diversity of needs of all learners through increasing participation in learning cultures, and communities, and reducing exclusion within and from education’.

The Ministry of Education (2003) defines Inclusive Education as “a system of educating all children irrespective of their diverse needs. This means that both the classroom and the out of class environments must offer possibilities for all children to access education in school closer to their home through learning and socialisation processes” (Ministry of Education, 2003, p. 7)

Simui, et al. (2009:9) in defining inclusive education in the Zambian context state that inclusive education is “A continuous process of increasing access, participation, and achievement for all learners in general education settings, with emphasis on those at risk of marginalisation and exclusion”.

In a similar interpretation, the Enabling Education Network (EENET) Manual for Teacher Trainers in Zambia (Module 1 - 2019, p. xxi) describes inclusive education as “A process of increasing the presence, participation and achievement of all learners in educational settings: Early Childhood Education – ECE, Primary schools, Secondary schools and tertiary institutions”.

The EENET definition above will be adopted for this study as the Ministry of Education is currently implementing the Inclusive Education Teacher Training Manuals by EENET to all teacher training institutions in Zambia.

Coles and Hancock in Hodkinson (2005), however, argue that a definition is less important and what is crucial is that schools should achieve a meaningful understanding of the core values of inclusion. Whatever the definition, Hodkinson (2019) suggests that definitions or processes must accept sentiments contained within the Salamanca Statement, where academic achievement is observed to come second to the development of self through individual choice.

In Zambia, inclusive education is a relatively new concept. It is mainly associated with disability and the school, and it has a special needs perspective. Muzata (2021) contends, that Zambia, to a certain extent, practices inclusive education as one of the models for the provision of special education to learners with disabilities. Currently the emphasis is on integration of learners with mild and moderate disabilities into mainstream classrooms while those with severe disabilities remain in special schools, special units and community rehabilitation centres thereby encouraging segregation.

The idea of integrating learners with disabilities into mainstream schools is evidently emphasised in both the Ministry of Education 1996 policy on education and the 2012 Disability Act. For example, the Ministry of Education 1996 policy states that “To the greatest extent possible, the ministry will integrate pupils with special educational needs into the mainstream institutions and will provide them with necessary facilities,” (Ministry of Education, 1996, p. 68). Further, the 2012 Disability Act also indicates that “except where a person with disability is required to be in a specialised institution due to the nature of the disability, a person with a disability shall not be deprived of the right to choose or the right to participate in social, political economic, creative or recreational activities.” (Government of the Republic of Zambia [GRZ], 2012, p. 75). Looking at the two scenarios, it is imperative to note that integration is different from inclusive education in practice.

While various studies have been done on views of teachers on inclusive education, there is very little, if any, that has been carried out on trainee and trained teachers’ understanding of inclusive education, challenges and experiences faced in teaching science in an inclusive secondary school.

For example, internationally, Boyle et al. (2013) examined the attitudes of secondary school teachers to inclusion in schools in Scotland. The findings indicated significant differences in gender, positions of authority, pupil support roles and newly qualified staff. The study revealed that teachers became less inclusive after probation. Further, the study indicated that female teachers were more inclusive than their male counterparts while Head Teachers were the most inclusive group overall, followed by Deputy Head Teachers.

In a similar study that was done in India, Tiwari et al. (2015) examined the perceptions and beliefs of general education teachers in Delhi, about the inclusion of students with disabilities in regular education classrooms. The study revealed that teachers' overall knowledge of inclusive education policies is limited. They also had conflicting perceptions of inclusion. In addition, they were found to ignore the policy on inclusion due to lack of institutional support and knowledge on classroom-level implementation.

Kamenopoulou (2018) conducted research on inclusion in education focussing on the capital of Columbia, Bogotá. The research foci were on inclusive education in practice, teacher preparation for inclusive education, and local understanding of inclusive education. The findings included a local understanding of inclusive education as synonymous with disability, special teachers as synonymous with inclusive education in practice, and big gaps in teacher preparation for inclusive education. Further the study indicated that focussing on the impairment within the individual leads to approaches often aimed at fixing the 'deficient' individual, instead of fixing the environment by making it more inclusive, hence leading to segregation and exclusion.

Regionally, some studies have also been conducted. For example, Makoele (2014) conducted a study in South Africa which sought to highlight the state of current debates around the development of the notion of inclusive pedagogy, its definition conception and operationalisation. The main findings of the study indicate that there is no universally accepted definition of inclusive pedagogy but that its meaning is contextually, philosophically, and operationally determined.

In a related study, Eunice et al. (2015) carried out research which thrust was to investigate the challenges facing the implementation of inclusive education programme in public secondary schools in Rongo Sub-County, Migory County, Kenya. The major findings were that, first, physical, and critical learning resources were either inadequate or were quite dilapidated. Secondly, there were inadequate specialised teachers to handle the special needs education curriculum. Third, there were several socio-economic and cultural variables and constraints effective teaching and learning in most sampled schools.

In Zambia, Ngulube et al. (2020) conducted a study that explored inclusive education policy implementation in secondary schools from the perspectives of teachers and school administrators. The findings showed that administrators held predominantly positive attitudes towards implementation of the inclusive education policy in secondary schools in Zambia. The findings also suggest that in secondary school settings, teachers can be in favour of implementing inclusive education with appropriate administrative, material, and school leadership support. However, the results revealed among others, a lack of clear school policy and policy guidelines to guide teachers, with many believing that specialised resources and government support were inadequate to effectively implement inclusive education policy in regular classrooms.

Muzata et al. (2021) conducted a study on the status of Zambia's inclusive education through the lenses of teachers, learning from teachers' perspectives about how inclusive education is being implemented and whether teachers receive adequate support to implement inclusive education to learners with disabilities. The study revealed that Zambia practices partial inclusion in which only the mild and moderate learners with disabilities are included in classrooms. Inclusive education is understood by teachers in the context of disability and teachers reported that they did not receive adequate support to implement inclusive education effectively.

Silondwa and Muzata (2019) analysed the challenges teachers and learners with visual impairment faced in Chinsali district of Zambia. Challenges included lack of specialised materials for science subjects and limitations in teaching skills on the part of teachers, to convert science concepts into units that could be easily understood by learners with visual impairment. They, therefore, concluded that if effective learning for learners with visual impairment is to be attained, their learning environments should be made to be highly constructive and realistic such as the use of braille is for totally blind pupils to maximise their learning ability.

Ndlovu and Mataf wali (2020) carried out a study that aimed at establishing the perception of teachers on teaching Integrated Science to grade eight and nine learners with hearing impairment in Zambia at selected Special schools. The main argument was that although teachers were qualified, they lacked specialised training, which negatively affected teaching of Integrated Science. Additionally, the study revealed a number of barriers to teaching Integrated Science including inadequate instructional materials, ill-training of teachers, inappropriate syllabus, communication barriers and inappropriate Integrated Science facilities.

Given the assumption that inconsistencies in achieving inclusive education exist because of the structure of teacher preparation programmes, insufficient supports provided to facilitate the inclusion of children with disabilities, and teachers' attitudes towards students with disabilities, as discussed above, this study aims to establish how teachers conceptualize inclusion as this would illuminate inclusive practices. There seems to be a 'dearth' on research in inclusive practices, especially at secondary school level. This study, therefore, endeavoured to have a clearer awareness of inclusion as practiced in schools by science trainee and trained teachers, and the meaning ascribed to it.

METHODOLOGY

The study aimed to investigate the trainee and trained secondary school science teachers' perceptions of inclusive education: challenges and experiences faced in an inclusive set up in Kitwe, Zambia. A qualitative case study design, involving three secondary schools practising inclusive education and a university training teachers of science in Kitwe district, Zambia was used. Furthermore, the study employed purposive sampling to select the three secondary schools and a university training teachers of science, with a sample size of 12 participants. The sample included 6 trained science teachers: 2 from each of the three secondary schools and 6 trainee science teachers.

Three data collection instruments were used, including, observation, semi-structured interviews, and focus group discussions. Data was analysed using coding and thematic analysis. This involved consolidating, reducing, and interpreting what participants said and what the researcher had seen during actual lesson/activity delivery and read from the documents, interviews, and focus group discussions.

FINDINGS AND DISCUSSIONS OF THE STUDY

The study sought to investigate trainee and trained secondary school science teachers' perceptions of the concept of inclusive education, and the challenges they faced in teaching sciences in an inclusive education setup. The following themes emerged:

Conceptions of inclusive education

Both trained and trainee teachers were asked to describe inclusive education according to their understanding and practice. The following are some of the findings:

The concept of inclusive education from the trained science teachers' perspective

It emerged that most teachers perceived inclusive education to mean integration, and education of disabled children in the mainstream schools. For example, one trained science teacher indicated the following:

Inclusion is where you take along every child regardless of the disability that a child has. You must put them in the same class together with the other pupils. The ones with handicaps, physically or mentally or sometimes you just take them along together with others. (Trained Science Teacher A1).

Another trained science teacher had the following to say:

Inclusive education is the type of schooling where the disabled children can learn together with other children that are able-bodied. Like those that are disabled, there are children that may have learning disabilities; some may have communication problems, some are unable to walk, others are slow learners, while others may have

mental challenges, but learning together in the same class with those without special needs. (Trained Science Teacher A2)

From the descriptions of inclusive education above, the core concern is the education of the children with disabilities regardless of the type of such a disability one has and whether such children with disabilities can learn. However, the underlying meaning in the first data quote is that it is the children with disabilities that are brought to mainstream schools to join the regular pupils meaning that such schools were originally meant for regular pupils and not those with special education needs or disabilities. For such schools to become inclusive, adaptations need to be made to show that there is meaningful participation in learning, which the participants did not mention. Their responses are in line with the assumption that teachers view inclusion to be exclusively about the education of children with disabilities, which is in line with the medical model which views a person with disability as abnormal (Oliver, 1996; Miles, 1999).

Furthermore, in the medical model people are categorised according to how different they are from what might be considered 'normal'. For example, the participants indicated the categories that included those with physical disabilities, slow learners, communication challenges, and mental challenges. Even though the focus on disability was relevant, such kind of approach to inclusion is as described by Dei (2005) as being limiting in that it is discussed as some form of special education. Additionally, the participants were talking about the physical location of the learners with disabilities in the school when they indicated the issue of putting them in the same class together with the others.

It was regrettable that the participants did not mention anything about the kinds of accommodations learners with disabilities would have found after being placed in those classrooms. Mere placement of such learners in the mainstream schools is known as integration, not inclusion. This notion agrees with the statement by Slee and Allan (2005) that when inclusive education is perceived to apply to a particular group, and when it is equated with a particular type of education or location, it leads to being exclusion. This ultimately makes inclusive education to be understood in a limited way.

Furthermore, another teacher from a different school described inclusion with emphasis on different classes or types of schools that are available. Hence, the teacher indicated:

I understand inclusive education as a situation whereby learners with different abilities are welcomed in schools despite their learning abilities and background, that is; include them in the 'normal' schools (Trained Science Teacher C1).

From the description above, teacher C1 referred to mainstream or regular schools as normal schools in trying to differentiate it from other schools, a view that has a possibility for labelling. This is because for a long time, Zambia's education system has used the medical model of disability through special education provision in forms of special schools and special units. Trained Science Teacher C's language is in line with the national policy document on education which indicates that as much as possible, pupils with special educational needs should be integrated into the 'normal' life and activities of the community and into ordinary schools (Ministry of Education, 1996).

But it must be emphasised that labels tend to marginalise individuals and their families as well as institutions. More so when they are categorised, individuals tend to become differentiated from each other and with time, these labels become defined, especially when they are used with negative connotations. This then makes access to active participation for learners with special education needs and disability to be reduced in schools as well as in the wider outside communities, as that is dependent on their condition. This is as Kamenopoulou (2018) indicated that focussing on the impairment within the individual leads to approaches often aimed at fixing the 'deficient' individual, instead of fixing the environment by making it more inclusive, hence leading to segregation and exclusion.

The concept of inclusive education from the trainee science teachers' perspective

During the Focus Group Discussion with trainee science teachers, it emerged that the concept of inclusive education was understood to mean an education for both children with disabilities and those without disabilities

using similar facilities. Both categories of learners are accommodated to understand the whole lesson. This can be evidenced by the excerpts below:

My understanding of inclusive education is that it is just a form of education that stresses much on both learners with disabilities and those without disabilities learning together using similar facilities Its main aim is to involve all learners and make sure that everyone gets the most effective education (Ref. 1).

Another trainee science teacher submitted the following:

I think inclusive education means accommodating all learners so that they can really understand the whole lesson. So, if I were to be simplistic, I would say, children with special educational needs require a modified education whereby all of them are accommodated in order to get the whole sense of the lesson (Ref.2).

From the excerpts above, it can be confirmed that the trainee science teachers viewed inclusive education as a wider concept which goes beyond just children with disabilities and those without disabilities learning together. Their understanding of the concept also included the issue of pedagogy where the issues of using similar facilities and modified education, were mentioned, suggesting that some adaptations may have to be applied to the teaching to make it meaningful and effective to all learners. These findings are in line with the study's revelation by Boyle et al. (2013) that indicated significant differences in gender, positions of authority, pupil support roles and newly qualified staff. The study also revealed that teachers became less inclusive after probation. As can be seen, trainee science teachers had a wider and more acceptable understanding of the concept of inclusive education than their trained counterparts.

Further in the discussion, it emerged that trainee teachers mentioned equality and equity in their understanding of the concept of inclusive education, although it was not exhaustive. For example, one trainee science teacher submitted the following when discussing the concept of inclusive education:

This is the kind of education which promotes equality or equity in the sense that it does not discriminate on who should benefit from the education process. (Ref.3)

The above submission, however, is only referring to the first part, which is equality. Equality refers to people having equal rights or opportunities, like in the case of a school scenario; one can talk of all children attending the same mainstream school regardless of their circumstances. The use of 'or' between 'equality' and 'equity', however, makes it look like the two terms mean the same thing, and yet they are different. This is because equity is about fairness and giving further support to the less disadvantaged so that they are at the same level with the advantaged. This is what is encouraged if inclusive education is to be realised. The issue of using both equality and equity resonates well with the definitions of inclusive education by various actors who emphasise the need for access to quality education by all learners and removing every barrier for everyone to benefit from quality education (EENET, 2019; Ministry of Education, 2009; Simui, et al. 2009).

It is worth noting that when trainee science teachers were talking about their understanding of including learners with special educational needs in the mainstream schools, they demonstrated that they had a good understanding of what equity meant. For example, one trainee science teacher indicated that:

Equity in this case entails, for example, that for the learners with disabilities who are wheelchair users and those with crutches, the environment should be adapted to their mode of mobility (Ref.4).

In the same vein, another trainee science teacher argued that:

Equity means being cautious of learners with problems with sight and those with hearing difficulties, by letting them sit in front, providing printed notes, looking directly at the learners and not being too fast in talking (Ref.5).

The examples given above are an indication that trainee science teachers were fully aware and had knowledge of the two concepts even though they seemed to use equality and equity interchangeably in the earlier discussion. It suggests that those trainee science teachers are up to date with latest developments at wider level in their

training. This is because their understanding of inclusive education includes the aspect of equity which in line with the Zambian Government's position and policy in general regarding the issue of inclusive education. For example, the educational policy document indicates that the ministry should integrate pupils with special educational needs into the mainstream institutions and should provide them with necessary facilities (Ministry of Education, 1996).

Challenges faced by trained science teachers in providing inclusive education.

Science teachers argued that they were facing several challenges to provide inclusive education. The major challenges that emerged prominently among teachers were inadequate funds, inadequate teaching and learning materials, limited time allocation, and lack of training in inclusive education strategies.

Inadequate funding

Inadequate funding emerged prominently as being one of the challenges trained science teachers were facing in the quest to implement inclusive education practices. This makes it difficult to teach science in an inclusive setting. For example, one trained science teacher indicated that:

We have problems with funding, and this makes me just do simple demonstrations for certain topics because I can't manage to buy apparatus and materials for experiments. (Trained Science Teacher C1).

Another teacher stated how the small allocation was at times misappropriated for other things other than its actual purpose:

There was one particular time when we had budgeted for a few computers and paper for our learners with special needs for use during remedial classes. However, when the grant was given, the money was used to buy paint for the ablution blocks and rectifying the water situation for the mainstream. (Trained Science Teacher A2).

Further, another teacher indicated that the said grants were limited in amounts to cover for most requirements and at times, were not available in schools:

I wouldn't comment much because it is highly administrative. We have no access to it, we don't know how much is disbursed, we don't know when it comes, and how often it comes. Sometimes when I request for funds, the administration just say that they don't have money', and then it ends there, (Trained Science Teacher B1).

For the revelation above, science teachers were facing challenges to implement meaningful inclusive education due to inadequate funding and sometimes due to lack of support from the administration. These findings resonate well with those from various studies reviewed earlier. For example, Eunice et al. (2015) reported that there were several socio-economic constraints affecting effective teaching and learning in most sampled schools. Ngulube et al. (2020) also indicated that government support was inadequate to enable teachers effectively implement inclusive education.

Inadequate teaching and learning materials.

All trained science teachers from all the three secondary schools indicated that they had challenges to do with teaching and learning materials. However, it emerged that all schools had textbooks for the pupils though in limited amounts. The books were just enough to be shared between two to three pupils, except for those with special educational needs who were allocated a book each and sometimes had typed notes subject to availability of paper. There were, however, concerns about the poor quality of the books as one teacher explained:

We have enough textbooks, but of course not good books. The books like those in the new curriculum; 'Progress in Integrated Science', and 'Progress in Biology' are good books, but you find that they have brought a lot of MK books (brand name or publisher) here which have shallow information on certain topics (Trained Science Teacher C2).

Having poor quality books in terms of content coverage means extra work for the teachers, as they must refer to many other books and make a comparison. They must strike a balance between what is to be omitted and what is to be included in their schemes of work, as well sharing, and emphasising to pupils what is important and what is not. This might be confusing for the learners especially those with special educational needs, as school handbooks are generally known to be tailored according to the general school curriculum and if not careful, pupils will end up studying something irrelevant. This becomes a big concern especially when there is no seriousness, commitment, and willingness on the part of the teachers, in adjusting lesson preparations to make sure the pupils get the right kind of knowledge relevant to them.

Another challenge in terms of teaching and learning was lack of science apparatus and materials to use during experiments. It emerged that sometimes teachers had to improvise to make the lessons practical and meaningful. This is evidenced by the submission made by one trained science teacher who highlighted the following:

If I am teaching on something like food tests, for example about egg protein; I will bring some eggs from home and then we do the experiment (Trained Science Teacher B2).

Improvisation in some instances came with a cost. It meant that teachers had to dip into their pockets to conduct a practical lesson, something which was dependent on teacher commitment, availability of resources and willingness to sacrifice from their meagre income. This sacrifice might not always have been possible and that would mean, at times certain topics would go without a demonstration as there was nothing else that teachers could do to alleviate the situation as narrated by another trained science teacher below:

Sometimes we just talk without demonstration; for example, If I am teaching on gases, maybe on preparation of oxygen; and there are no materials and apparatus, I cannot improvise. In that case, I would just talk as though I am giving a lecture (Trained Science Teacher C1).

Such findings are in line with the findings by Silondwa and Muzata (2019) and Ndlovu and Mataf wali (2020) whose studies revealed that science teachers faced various challenges in implementing inclusive education, such challenges included lack of specialised materials for science subjects and inadequate instructional materials and apparatus in general. This unfortunate state of affair becomes a challenge for learners, more so for those with special education needs.

The issue of inadequate materials and apparatus negatively affects learners in an inclusive set as can be attested by the submission from one trained science teacher:

I have some deaf learners, and they learn better when they do something practical. If they are engaged and involved in an activity, it helps them to understand, remember, and recall (Trained Science Teacher A2)

Generally, when learners do an activity that is practical, it helps shape their understanding of concepts because there is something real in front of them. Not only does science practical shape understanding of concepts, but they stimulate interest and enjoyment as learners are curious to discover something from their experiments and are motivated by their findings. This, however, calls for adequate time and enough resources to cover the lesson.

Limited time allocation

Limited time allocation or generally inadequate time emerged as one of the major challenges that trained science teachers were facing in realising inclusive education strategies. Most teachers felt that they had inadequate time for offering individual attention due to limited period allocation time. For example, one trained science teacher narrated:

For example, some learners have a short memory span and struggle to store information in their long-term memory, therefore, we need to get around it somehow and repeat teaching the same things for them to understand, but time allocated is limited to facilitate that (Trained ScienceTeacherB1).

The teacher seems to have had a problem of preconceptions of the learners' abilities specifically with regards to subject achievement. One would think she went into class already defeated that she could not have enough time

for individual attention for them. The first implication is that learners could have reduced ability in terms of abstract content and creative thinking and therefore, are difficult to teach. However, when she says “we need to get around it somehow” it shows a different perspective of her side which implies that she is somehow positive, eager to make a change, and realistic about how learners can be helped. What she says further suggests that there is hope with her acquired pedagogy of ‘repetition’ as the learners are at least able to grasp something when that is applied, even when repetition would sometimes mean going beyond the stipulated time allocation.

Another trained teacher complained about the time allocation of 80 minutes for a double lesson not being enough. This is especially true in an inclusive classroom where there are learners with different abilities and may require individual attention and others with certain conditions or disabilities that are difficult to handle. Hence, the teacher submitted: example of a pupil with epilepsy in one of her classes:

There is one learner with epilepsy in my class. If he has an attack then you start running up and down, trying to attend to him. The whole lesson comes to a halt, and everyone is affected. Even just the environment is not suitable for them because we don't have facilities (Trained Science Teacher A1)

From the excerpts above, there is insufficient support for learners with special educational needs in some inclusive classrooms. There is an indirect suggestion that extra personnel support for learners with specific needs are needed to attend to their needs, when necessary, rather than the teacher abandoning the class to attend to the child instead, as was the case with the child with epilepsy. The teacher acknowledged that the environment was not suitable due to lack of facilities. The acknowledgement is an indication that teachers are aware of what an inclusive environment should look like and are confirming that mainstream classrooms are not suitable for all students unless with proper adjustments. These findings are in line with those by Muzata et al. (2021) that revealed that Zambia practices partial inclusion in which only the mild and moderate learners with disabilities are included in classrooms. Further, the study indicated that teachers did not receive adequate support to implement inclusive education effectively.

One trained science teacher, however, was honest and brought out the issue of not helping slow learners at times in a manner they are supposed to be helped:

Sometimes we find it cumbersome to attend to all needs of slow learners i.e. if you have classes from 07.30 hours to 14.00 hours that day, then it is hard to attend to individual learners due to time. At the same time, we are expected to maintain high passing rates for our classes, so we try to balance the two (Trained Science Teacher C1).

Other than the mere mention of inadequate time, the teacher touched on a significant point of slow learners who may require extra time and attention, which might only be applicable after lesson times. If individual attention is not given at the time it is required, it means even if the learners are included (present) in the lesson, their level of learning is compromised if they are not fully participating. As can be seen here, there were two conflicting issues the teacher had to deal with: the issue of individual attention for slow learners and the general curriculum output for the whole class. The teacher's views may sound unprofessional and that she was ignoring slow learners in an inclusive classroom, but that is just one example of the reality of what goes on when teachers are left to make decisions for themselves without proper guideline and monitoring.

Lack of training in inclusive education strategies

It became evident that most of the trained science teachers had no training in inclusive education strategies but were trying using their own discretion to include all the learners as can be evidenced by the following excerpt:

Last year I had a child who is now in grade 10, who had mobility problems. Sometimes we would do outside activities..... For example, an activity on 'pulse rate' requires someone to move and then you get the pulse. The friends would say 'Just sit there we will get the stopwatch'. I would intervene and ask him also to move. Then he would struggle to move, take the pulse and struggle to sit. So, it gives you knowledge on how to handle such a person. Where you can include them, they should feel part and parcel of that class (Trained Science Teacher A2).

By the mere fact of learning in the same class with other learners without mobility problems, equal rights of being in school for the boy were applied, which was automatic. The issue of equity came in where the teacher insisted that the boy should be involved in movement, while providing ‘waiting time’ for him to get to the stopwatch. The teacher was interested in achieving fair student outcomes, as opposed to having same outcomes for all students. Getting the stopwatch to him would not have made him participate meaningfully and would have affected his pulse rate results. At the same time, the teacher encouraged the learner to have confidence in himself be positive about school and learning.

However, one trained science teacher narrated how she felt inadequate, less effective, and without enough skills to handle learners with special educational needs when she was sent to a class with students with hearing impairment without any knowledge or training on how to handle such learners. The teacher, therefore, submitted that:

They would just give you a class and say go and teach that class without any guidance or orientation I would write new terminologies for the lesson or put up a diagram like that of heart on the board depending on the topic, and rely on two deaf students who were good, to interpret the words to the colleagues while I was also learning from them slowly. I was always guilt that I had not helped them enough and would be responsible for their poor performance if their results were not good (Trained Science Teacher C2).

The above account seems perhaps extraordinary, and rather moving that a newly qualified teacher without any training in inclusive education could be sent to an inclusive class. The first assumption is that perhaps the general teachers at the time felt it was not their responsibility to teach children with special needs in a regular school as they were not trained as special education teachers but subject teachers. Their actions were perhaps targeted at defying the education system, and not necessarily targeting an individual teacher. What they expected from the teacher was just to go and teach normally, without changing her pedagogy to accommodate all learners. These findings resonate well with those of Ngulube et al. (2020) whose study indicated that secondary school teachers are in favour of implementing inclusive education if they have appropriate administrative, material, and school leadership support. However, such support systems are not there.

CONCLUSION

Drawing from the study’s insights, the following conclusions emerge there are misconceptions regarding inclusive education. Both trainee and trained secondary school science teachers often misconstrue inclusive education as mere mainstreaming of children with special needs. The distinction between integration and genuine inclusion remains blurred. To foster true inclusion, it is, therefore, recommended that educators must grasp the holistic essence of inclusive education beyond surface-level practices. The other conclusion that can be drawn from the above discourse is that there is partial inclusion and therefore, it is recommended that proper inclusive education strategies are put in place. Teachers face practical challenges that hinder full implementation of inclusive practices. Despite their best intentions, many end up practicing partial inclusion due to these obstacles. The study, therefore, underscores the urgency of equipping both trainee and trained science teachers with effective strategies for authentic inclusive education. In summary, bridging the gap between policy definitions and classroom realities requires concerted efforts. The study, therefore, recommends the prioritization of professional development, resource allocation, and a deeper understanding of inclusive pedagogies to create genuinely inclusive learning environments for all students.

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